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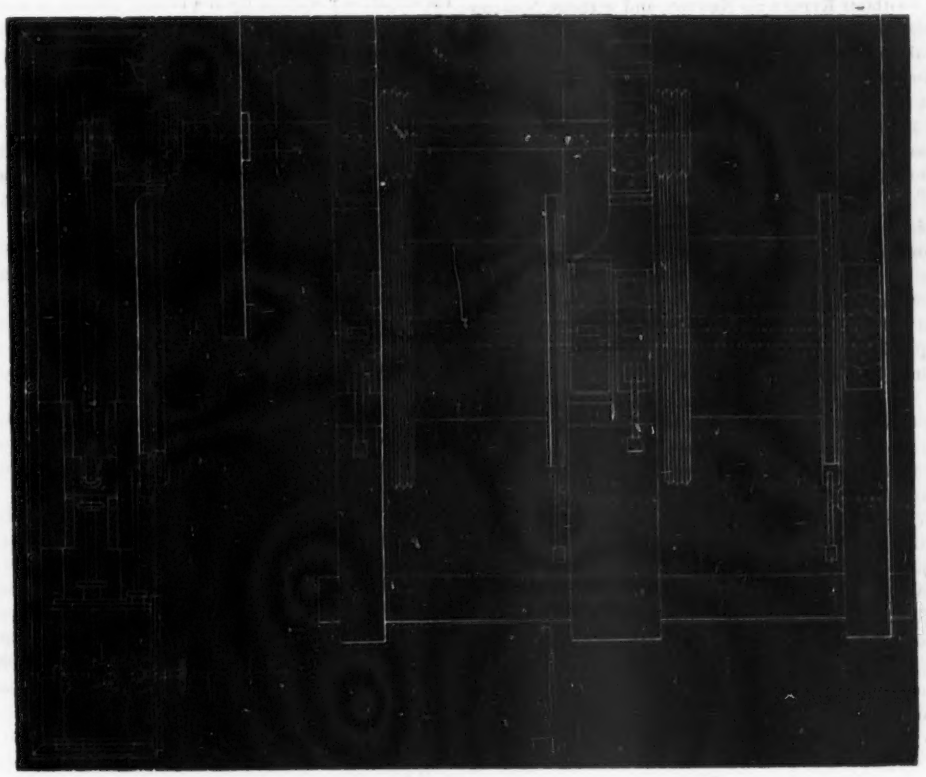
Mine Machinery.

THREE general types of hoisting machinery for mines are made on the Pacific coast. One has friction gearing, lowering by a brake. Another has spur gearing, and the cage is lowered by reversing the engine. The third also has spur-gearing, lowering being accomplished either by a brake or the engine. In the machine illustrated on this page, the first of these types is shown. It is designed for two shafts and for ordinary round ropes. The engine runs in one direction only and the drums are put in or out of motion by sliding them along their sole plates in or out of contact with the driving pulleys, which of course are grooved. The brake is applied as the drums slide away from the driving shaft and controls the motion of the cage. The drums are flat and plain. This style of machine is much used in the West, especially for shafts that are not very deep. On the deep shafts of the Comstock, and similar mines, where the time of the descent is sufficiently long to introduce unevenness into the engineer's pressure upon the brake, the other styles are more in favor, though when the smoothness and freedom from accident of the friction gearing are desired a few additions to the gearing would give the engine the same control of the cage in the descent, as in the lift. Messrs. H. J. BOOTH & Co., of San Francisco, are the makers of this machine.



FRICTION HOISTING ENGINE, UNION IRON WORKS.

Notes from the British Association Meeting.

SIEMENS' PYROMETER.

PROFESSOR G. C. FOSTER, F.C.S., read a report on Siemens' Pyrometer. The action of this instrument depends on the decrease in the conductivity of a platinum coil when it was heated. When a coil was hot the freedom with which an electric current was transmitted decreased, and by measuring that decrease with an electrometer the temperature was ascertained. A committee of the Association was appointed to examine its applicability to the determination of furnace temperatures, and one of the first points examined was whether it always cooled back to the same zero point. It was ascertained that it did not—that every time the heating and cooling down was repeated there was a permanent rise in the zero point. Professor WILLIAMSON had found that platinum underwent a change when heated with the silica in a reducing atmosphere; this, of course, modified the conducting power of the wire. Mr. SIEMENS endeavored to remedy this by surrounding the platinum wire with a platinum tube, an iron tube being placed outside of all. Unfortunately, however, their experiments did not show that this had any particular efficiency in doing away with the defect in question. In their experiments it had been found that a coil whose resistance before heating was 9.938, and at the extreme temperature attained 31·0, when cooled down again showed instead of a resistance of 9.938 one of 10.465, and other trials showed an equal permanent change. Thus there was not that improvement which was hoped for. Nevertheless, although the scientific value of the instrument was not great, it was yet of great practical advantage. The committee hoped, if appointed for another year, to make further researches. In reply to a question, Professor FOSTER said that they had not this year experimented on the point as to whether the advance in the zero point was progressive, or whether after a great number of heatings, there was a tendency to fixity of the zero point. Last year, however, they noticed some such tendency with a pyrometer which had been heated fifty times. The President asked what temperature would be indicated by the advance from 9.938 to 10.465, if it were caused by increase of temperature instead of a permanent advance of the zero point. Professor FOSTER replied that it was very small indeed. In answer to other questions, Professor FOSTER said that he could not say whether one long-continued heating produced the same effect on the zero point as several briefer heatings. The highest temperature employed in the experiments was that of a common fire burning briskly. Experiments made by Professor WILLIAMSON had shown that the change in the zero point observed in his experiments, was due to the alloying of the platinum with silica. The President observed that the pyrometer must be of great practical use, despite the error which was their difficulty, when in experiments with such high temperatures the error only amounted to some 1.5 deg.

Mr. GLAISHER read an interesting paper on the history of some of the characters used in mathematics.

THE CONDUCTING POWER OF ROCKS.

Prof. HERSCHEL and Mr. LEBOUR have been experimenting on this subject. Twenty-eight specimens of rocks were reduced to uniform circles of 5 in. diameter and ¼ in thickness, carefully gauged. Out of six specimens that had been tried, slate plates, cut parallel to the plane of cleavage, transmitted the heat faster than any of the others. Where the flow of heat had become uniform the water was raised one degree of Fahrenheit thirty-two seconds. With marble, sandstone, granite, and serpentine, about thirty-nine seconds were required to raise it by the same amount. The greatest resistance to the passage of heat was offered by two specimens of shale, gray and black, from the coal measures in the neighborhood of Newcastle, which occupied forty-eight or fifty seconds in raising the water one degree, or half as long again as the time taken by the plate of slate. The black shale was highly fossiliferous, and allowed heat to pass more slowly than the other harder and more compact gray species of the same kind of rock. These experiments were not extended further, as uncertainty regarding the real temperatures to which the surfaces of the plates were exposed introduced an unknown element into the question of their conducting power. It was stated, in conclusion, that the foregoing observations were not only of a very great interest from a purely physical point of view, but had a great geological importance, especially as regards underground temperature and all the numerous geological problems depending on it. Even with the meagre array of actual

readings which it had been possible to arrive at, certain results had been obtained which gave great promise of the value of these investigations. It seemed to be proved by the experiments that the conducting power of different rocks varies strictly according to their lithological character. Very crystalline rocks, such as granite, and serpentine, and statuary marble, allowed heat to pass rapidly through them. Slate plates, with their uncrystalline compact structure, had a still higher degree of conductivity. The crystalline nature of a rock alone is not, therefore, the lithological test of its conductivity. The lowest powers of conductivity were found to belong, among the specimens experimented on, to shale. The black shale, which was lower than the grey, was softer and more argillaceous than it. The grey shale has a considerable admixture of arenaceous matter and mica. The difference, however, between these two was so slight that, in the present preliminary researches, when much must be allowed to error, it may be left out of consideration altogether.

Prof. SMITH, in opening the Mathematical and Physical section, took occasion to point out, by an example drawn from ancient history, the certainty with which the results of study, however abstract, will find at some time their proper field of usefulness: "The early Greek geometers, considerably before the time of EUCLID, applied themselves to the study of the various curved lines in which a conical figure might be cut by a plane—curved lines called conic sections. It is difficult to imagine that any problem had more completely the character of a problem of mere curiosity than this one of the conic sections must have had in those earlier times. Not a single natural phenomenon which in the state of science at that time could have been intelligibly observed would be likely to require for its explanation a knowledge of the nature of these curves, still less could any applications to the arts have been possible. A nation which did not use the arch was not likely to use the ellipse in any work of construction, and yet when the fullness of time was come, these seeds of knowledge which had existed so long bore splendid fruit in the discoveries of KEPLER. It was not too much to say that without the treatise of the Greek geometers on the conic sections, there would have been no KEPLER—without KEPLER no NEWTON, and without NEWTON no science in our modern signification, or at least no conception of nature as now laid at the basis of all our science of nature as subject in its smallest as well as its greatest phenomena to exact quantitative relations and to definite numerical law. That was an old story, but it had always seemed to convey a lesson needed even in our own time against a species of scientific utilitarianism which urged the scientific man to devote himself to the less abstract parts of science as being more likely to bear an immediate part in the augmentation of our knowledge of the world."

He then, by another example, showed how the science of Mathematics is every day receiving wider application and a more practical usefulness: "In the course of the present year a treatise on electricity had been published by Professor MAXWELL, giving a complete account of the mathematical theory of that science, as we owed it to the labors of a long series of distinguished men. No mathematician could turn over the pages of that volume without very speedily convincing himself that they contained the first outlines of a theory which had already added largely to the methods and resources of pure mathematics, and which might one day render services to that abstract science not less than those which it owed to astronomy, for electricity now, like astronomy of old, had placed before the mathematician an entirely new set of questions, and the great practical importance of telegraphy had caused the methods of electrical measurement to be rapidly perfected to an extent which rendered their accuracy comparable with that of astronomical observations, and thus rendered it possible to bring the deductions of theory every moment to the test of fact. It must be considered fortunate for the mathematician that such a vast field of research on the application of mathematics to physical inquiries should be thrown open to them at the very moment when the scientific interest in the older mathematical astronomy had, for the moment, flagged, and when the very name physical astronomy, so long appropriated to the mathematical development of the theory of gravitation, appeared likely to be handed over to that wonderful series of discussions which had already taught us so much concerning the constitution of the heavenly bodies themselves."

The American Institute Fair.

AT length the exhibitors are fairly at work. The rink is well filled with exhibitions and seems to be equally patronised by the public. In the machinery department to which we will first give our attention there are many of the well known standbys of the Fair—exhibitors who after a few years are scarcely noticed by newspapers but whose labors are well appreciated by the constantly changing crowd of visitors. But the Fair is not deficient in novelties.

One of these is a planing saw patented by C. V. LITTLEPAGE & Co., 321 East 22nd street. This is an apparently successful attempt to solve by simple means the important problem of planing by steam. It is well known to our readers that only a few years ago there was a good deal of attention given to this subject, and planers were invented which reduced rough plank to smoothness by the operation of a series of planing knives graduated from coarse to fine, and drawn in regular succession lengthwise over the board. The poor success had with those machines seems to have effectually prevented their adoption. But Mr. LITTLEPAGE shows some very good work done by merely attaching knife edges to a circular saw. These knives project slightly on each side of the saw, so that a kerf cut through a board is smooth on both sides. The knives are set a little within the circumference of the teeth and the saw accordingly does its legitimate work of dividing the stuff before the knife edge comes along to pare down the surfaces. Small saws are set with two knives, larger ones with four. The simplicity of this invention, its rapid work and ease of adjustment, make it a self evident success provided its work is well done. The specimens exhibited at the fair, and turned off at demand by the saw, are certainly admirable. Their surface is perfectly smooth and even. Soft woods require no further preparation, their surface being superior to that given by hand. Hard woods are reduced to an even surface not quite so highly finished as the softer kinds. The greater part of their preparation is however accomplished, and very little hand work will finish it. This invention which enables the sawmill to turn out its stuff in such superior state, without additional cost can hardly fail to be well received.

Cornell University exhibits a pair of very nicely finished surface plates, the adhesion of which through the force of mechanical contact shows their good quality. They are creditable to the technical workshop which produced them.

BRAYTON'S Ready Motor, exhibited by Mr. H. M. HAMBLIN, 24 Cliff street, is a gas engine using ordinary illuminating gas, petroleum or any other hydrocarbon, mixed with air. The air pump is a cylinder placed vertically upon the gas cylinder which is also vertical and worked by a through piston rod. This mixes air with gas drawn from the street mains producing any pressure desired. Both cylinders are single acting, and the exhibitor states that the machine at the fair—5 horse power—uses 80 cubic feet of gas per hour, or 4 gallons of hydrocarbon oil.

The triangular belting which attracted so much attention last year, no longer occupies its prominent place, and the main belt is of the old flat kind. This year the machinery, or a large part of it, is worked by a stationary engine, made by JEROME WHEELOCK, Worcester, Mass., the peculiarity of which is its valve gear. The valve box is placed on the under side of the cylinder, and the valves are segments of cylinders, which in their oscillation to and fro, cover and uncover the steam passages. The valve seats and faces are long rounded surfaces, and the oscillatory motion upon a center, secures a minimum of friction. The valve gear is the simple excentric rod and wrist plate, which can be disengaged at will, and the valves worked by hand. In every respect the engine running at the Fair seems to be first class. It is ranked as 12 horse power.

Messrs. WM. D. ANDREWS & BROTHER have their rotary pumps in full action. Their stand is always an attractive one to visitors, who look with wonder upon the tiny half-horse power oscillating engine working with lightning speed, and turning out a stream of water ridiculously out of proportion to its apparent powers. Their hoisting machine which has been described in these columns is also on exhibition.

BRADLEY'S cushioned hammer, which probably bears out better than most inventions the proprietors' assertion that it is "the greatest improvement of the age for forging iron and steel," is exhibited, though not at work. This machine has had such a rapid introduction into forges that it is hardly necessary to say that the hammer cushions on India rubber springs which are adjusted so that the character and force of the blow are fully under control. The hammer is well made and evidently deserves its success.

A nickel plated specimen of the Baxter engine attracts a great deal of attention. There seems to be no diminution in the favor with which this compact and excellent machine is received. Its solidity and evident superiority of its workmanship are proofs both of success and of merit.

The Locomotive Tyre Works of Jersey City, W. BAILEY, LANG & Co., exhibit a tyre-rolled by them from a steel bloom made by CAMMELL & Co. of Sheffield; and also an ingot, cast in circular shape ready for rolling to a tyre. However common such exhibitions may be abroad, the manufacturers of such articles in this country seem little disposed to take the trouble necessary to an exhibition of their work. We believe there is not another tyre or even any similar heavy piece of work in the Fair, and Messrs. LANG have shown as much good sense as "enterprise" in this simple exhibit, which will be passed unnoticed by the great crowd of curiosity seekers.

Messrs. W. H. WATERS, Chicago, exhibit a friction drop hammer, and Messrs. BILLINGS & SPENCER, Hartford, Conn., have a drop hammer and a large card of small forgings made by it.

The BLAKE crusher stands with a pile of crushed rock under its jaws, and a notice posted up offering a reward to any one who will bring a stone which the machine cannot master. It is a safe offer, and we believe no one has yet made a pack-horse of himself in trying to win the prize. The principles which have been so successfully applied in the BLAKE machine are exhibited by another, which is designed for the milder work of breaking ice. This is DIXON & TUNSTILL'S ice-crusher. The whole aparatus is shown, including a long table on which the ice slides down to the jaws of the breaker. These are arranged like those in the BLAKE machine, but are armed with long teeth. From seven to eight tons of ice per hour is said to be the capacity of the machine. Hand sizes are also made which will break from four tons down.

A well-devised bevel friction gear is shown by C. VAN HAAGEN & Co., 2341 Callowhill street, Philadelphia. It is made up of a series of dished rings arranged in the shape of a truncated cone; the space between the rings being the same as their thickness. Two of these cones will therefore fit into each other, the two sets of rings interlocking, and each ring forming a continuous cog. They are made of sizes to transmit powers up to 30 horses, and appear to be an excellent and serviceable means of transmitting power.

The SEARFOSS portable grinding mill is chiefly noticeable for its use of friction-

roller bearings. The shaft of the running stones rests on small rollers, which are disposed entirely around it, and the whole arrangement is enclosed in an iron ring. When the stones move the whole system of rollers revolves within the ring. No oil is necessary, and apparently to show the small friction in the arrangement the exhibitors (TULLY & WILDE, 20 Platt st., New York), run a heavy stone by a belt carried from the main shaft to the spindle, without using a pully on either.

A good assortment of drills, hand-punches and hand-shears for bar and plate iron is shown by the Biddle Manufacturing Company, 102 Chambers street, New York.

A serviceable siphon for removing acids and similar fluids from carboys is exhibited by E. T. JENKINS, 66 North Third street, Williamsburgh, N. Y. It is not especially novel, as the method of filling the siphon by blowing through a tube instead of drawing the air by the mouth is an old one. The continued use of the ordinary siphon, however, which is often so dangerous and wasteful proves that there is a good field for such an instrument.

Mr. JOHN T. HAWKINS, 283 East Broadway, has a machine for turning pill boxes, button moulds, etc., at work. In this the lathe tool and circular saw revolve side by side in fixed positions, and the rest which carries the piece of lumber to be turned can be swung from the tool over to the saw. The turned end of the stick is thus cut off. There are no close guides for the lumber to pass through, and crooked as well as straight stuff can be used.

Modern Steel.

THE opening address before the mechanical section of the British Association for the Advancement of Science had for its theme the important topic of steel. Its author was Mr. W. H. BARLOW, C. E., F. R. S.; and his treatment of the subject was so excellent that we make room for the address, though it is a long one:

In the observations which I have to address to you I shall not attempt a general survey of a subject so vast and so varied as the manufactures of this country, nor shall I attempt to describe the many new and beautiful inventions and mechanical appliances which form a distinguishing feature of the age in which we live; but I shall endeavor to draw your attention to one of the new materials—namely, modern steel—a material which, though of comparatively recent origin, has already become an important industry, and whose influence in the future seems destined to vie in importance with that resulting from the introduction of iron. I have used the term "modern steel" because, although the great movement in simplifying and cheapening the process of producing steel is necessarily associated with the name of Mr. BESSEMER, yet we have further important steps taken in a forward direction as to the production and treatment of steel by Dr. SIEMENS and Sir JOS. WHITWORTH, and others, both in this country and abroad. It is now seventeen years since Mr. BESSEMER read a paper at the meeting of the British Association at Cheltenham, which was entitled, "On the Manufacture of Iron and Steel without Fuel." Not long afterwards I attended one of the early experiments made by Mr. BESSEMER, in London. On that occasion most of those who were favored with an invitation to be present saw for the first time that wonderful process in which, by the simple aid of a blast of atmospheric air and the addition of a little manganese, a cauldron of melted cast iron was, in the space of some twenty minutes, converted into a material which approached wrought iron in so far that it was malleable, but differed from it in other ways, the precise character and quality of the material produced being at that time not fully known. I was kindly permitted by Mr. BESSEMER to take away with me one of the small ingots cast on that occasion, and had it made into a bar in the work-shops of the Midland Railway at Derby, with the object of testing its strength. Just as the bar was finished it broke under the hammer, and an attempt to weld it together again, treating the metal as iron, failed. This led to a consultation among the smiths who had assembled round this mysterious bar, and, after some further trials, the metal was unanimously pronounced to be *steel*. Among those who attended that experiment at Mr. BESSEMER's works, there were not wanting some of that class who, though they admitted the genius and intelligence which devised the process, and expressed their admiration of it as a scientific curiosity, were nevertheless very incredulous as to it ever becoming practically useful; and it was not without much labor and skill in surmounting the difficulties of the case, indomitable perseverance in overcoming rooted prejudices, and great courage in undertaking the necessary expenditure, that Mr. BESSEMER succeeded in producing that most valuable new material now known as "Bessemer steel."

It is satisfactory to know that Mr. BESSEMER has often expressed his firm conviction that had it not been for the publicity given to his invention through the paper which he read before the Mechanical Section of the British Association in 1856, and the great moral support afforded him by men of science whose attention was thereby directed to it, he believes that he would not have succeeded in overcoming the strong opposition with which his invention was met in other quarters. About this time, or perhaps a little later, a material was produced called "puddled steel," and about the same time the metal known as "homogeneous iron." The movement which had begun in the production of cheap steel was further assisted and developed by the regenerative furnace of Dr. SIEMENS, by the introduction of the Siemens-Martin process of making steel, and further and most important progress is suggested by the recent process introduced by Dr. SIEMENS of making steel direct from the ore. According to the returns published by the jury of the International Exhibition of 1852, the total annual produce of steel in Great Britain at that time was 50,000 tons. At the present time there are more than 500,000 tons made by the Bessemer process alone, added to which Messrs. SIEMENS' works at Landore produce 200,000 tons, besides further quantities which are made by his process at Messrs. VICKERS, Messrs. CAMMELLS, the Dowlais, and other works.

I shall not, however, detain you by attempting to trace up the history and progress of steel, nor atttempt to notice the various steps by which this branch of industry has been brought to its present important position. My object is to draw attention to this material as to its use and application for structural and engineering purposes. The steel produced by the Bessemer process was at a very early stage employed in rails and wheel-tires. In both these applications the object sought was endurance to resist the effects of wear, and toughness to prevent fracture by blows. There does not exist at present sufficient information to determine accurately the relative values of steel and iron when used for these purposes. As used for wheel-tires, steel had to compete with iron of the highest quality, but it is nevertheless introduced on most of our railways. The iron used in rails was not of such high quality, and the difference in duration shows a very marked advantage in the employment of steel, the duration of steel rails being variously estimated at from three to six times that of iron.

Steel is also extensively used for ships' plates, and by the War Department for lining the interior of the heaviest guns; while Sir JOSEPH WHITWORTH and Messrs. KRUPP make guns entirely of steel, though for these purposes the metal is of different quality and differently treated, in order to withstand the enormous concussions to which it is subjected. And further, we have steel used on railway-axles, crank-axles for engines, in boilers, in piston-rods, in carriage springs, and for many other purposes. But notwithstanding these various employments of steel, there continues to be a difficulty in applying it to engineering structures in this country. The want of knowledge of the physical properties of steel having been the subject of remark at a discussion at the Institution of Civil Engineers in 1868, a committee, composed of Mr. FOWLER, Mr. SCOTT RUSSELL, Captain GALTON, Mr. BERKLEY, and myself, undertook to conduct a series of experiments upon this subject. Our services were of course rendered gratuitously, but the expenses of carrying out this inquiry, and the samples of steel to be tested, were liberally furnished by the firms of Messrs. Bessemer, Messrs. Jno. Brown & Co., the Barrow Hæmatite Company, the Bolton Iron Company, Messrs. Cammell & Co., Messrs. Lloyds, Fosters & Co., the Newark Bridge Company, Messrs. Naylor, Vickers & Co., Messrs. Turton and Sons, Messrs. Firth & Sons, and Messrs Siemens. The experiments recorded consist of four series. The first were made for the committee by Mr. KIRKALDY with his testing-machine in London, and were chiefly directed to ascertain the relation which subsists between the resistances of tension, compression, torsion, and transverse strain. In this series of experiments twenty-nine bars, 15ft. long, were used, each bar being cut into lengths, and turned or planed into suitable forms for the respective tests, so that a portion of each bar was subjected to each of the above mentioned tests. The tensile resistance varied in the different qualities of steel from twenty-eight to forty-eight tons per inch, and the experiments established conclusively that the relation subsisting between the several resistances of tension, compression, and transverse strains is throughout practically the same as in wrought iron; that is to say, that a bar of steel whose tensile strength is 50 per cent. above that of wrought iron will exhibit about the same relative increase of resistance under the other tests. They further showed that the limit of elasticity in steel is, like that of wrought iron, rather more than half its ultimate resistance. The total elongation under tensile strain, and the evidences of malleability and toughness, will be referred to hereafter. The second series recorded in the book published by the committee gave the results of tempering steel in oil and water. They were made by the officers of the gun factory at the Royal Arsenal at Woolwich, and show a remarkable increase of strength obtained by this process. This property of steel is now fully recognised and made use of in the steel which forms the lining of the largest guns. The third series of experiments was made by the committee upon bars 14ft. long, 1¼in. in diameter, with the skin upon the metal as it came from the rolls. The object of these experiments was specially directed to ascertain the *modulus of elasticity*. They were made with the testing machine at H. M. Dockyard at Woolwich, which machine was placed at our disposal by the Admiralty. The bars were obtained, with some exceptions, in sets of six from each maker, three bars of each set being used in tension and three in compression. Bars of iron of like dimensions were also tested in the same way, in order to obtain the relative effects in steel and iron. In these experiments sixty-seven steel bars were tested whose tensile strength varied from thirty-two to fifty-three tons per inch, and twenty-four iron bars varying from twenty-two to twenty-nine tons per inch.

The amount of the extensions and compressions were ascertained by *direct measurement*, verniers being for this purpose attached to the bar itself, 10ft. apart, so that the readings gave the absolute extensions and compressions of this length of the bar.

These experiments, which were very accurately made, showed that the extension and compression of steel per ton per inch was a little less than of wrought iron, that the extension and compression were very nearly equal to each other, and that the modulus of elasticity of steel may be taken at 30,000,000, which result agrees with the conclusions arrived at by American engineers on this subject. This property of the metal is important in two respects. First, because, inasmuch as the extension per ton per inch is practically equal to the compression, it follows that the neutral axis of a structure of steel, strained transversely, will be in the center

of gravity of its section, and that the proper proportion to give to the upper and lower flanges of a girder, when made of the same quality of steel throughout, will be the same as in wrought iron. Secondly, because the modulus of elasticity of steel is practically equal to that of wrought iron, and the limit of elasticity is greater, it follows that in a girder of the same proportions as wrought iron, and strained with an equal proportion of its ultimate tensile strength, the deflection will be greater in the steel than in the iron girder, in the ratio of the strength of the metals; so that if it is necessary to make a steel girder for a given span deflect under its load the same amount as an iron girder of the same span, the steel girder must be made of greater depth.

The fourth series of experiments were made by the committee on riveted steel, and show clearly that the same rules which apply to the riveting of iron apply equally to steel; that is to say, that the total shearing area of the rivets must be the same, or rather must not be less, than the sectional area of the bar riveted. Having thus obtained a knowledge of the behavior of steel under different strains, we may trace in what manner its employment would operate on the weight of metal required for large engineering structures. But before doing so I would call your attention to the question of the absolute tensile strength. Taking Mr. Kirkaldy's experiments in conjunction with those made by the committee, there is a greater range of strength exhibited, commencing as low as that of the best iron, and extending to above fifty-three tons per inch. This great range of strength is due to the different qualities and make of the steel tested, and must not be mistaken for irregularity of strength in the manufacture, on the contrary, in the experiments made by the committee, in which three bars of each make were broken, the strengths, with the exception of one set, are as uniform as in the iron bars similarly tested. It is also to be observed that in applying steel to engineering structures we may dismiss from consideration those superior qualities which are of high price, and made in comparatively small quantities. I propose, therefore, to confine my observations to the mild steels, such as are made by the "Bessemer," the "Siemens-Martin," and other processes having a tensile strength varying from thirty-three to thirty-six tons per inch, a material which is made in large quantities and at moderate cost.

Following the same rule as is adopted for wrought-iron (namely, that the maximum strain on the metal shall not exceed one-fourth of the breaking weight), we may consider steel of this quality capable of bearing at least eight tons per inch, instead of the five tons per inch estimated for like purposes in iron. We know from established mechanical laws that the limiting spans of structures vary directly as the strength of the material employed in their construction when the proportion of depth to span, and all other circumstances remain the same. We know also that, taking an ordinary form of open wrought-iron detached girder (as, for example, when the depth is one-fourteenth of the span), the limiting span in iron, with a strain of five tons to the inch upon the metal, is about 600 ft.; and it follows that a steel girder of like proportions, capable of bearing eight tons to the inch, would have, theoretically, a limiting span of 960 ft. This theoretical limiting span of 960 ft. would, however, be reduced by some practical considerations connected with the minimum thickness of metal employed in certain parts, and it would, in effect, become about 900 ft. for a girder of the before-mentioned construction and proportions.

The knowledge of the limiting span of a structure, as has been explained elsewhere, enables us to estimate very quickly, and with close approximation to the truth, the weight of girders required to carry given loads over given spans; and although the limiting spans vary with every form of structure, we can obtain an idea of the effect of introducing steel by the relative weights of steel and iron required in girders of the kind above mentioned. Assuming a load in addition to the weight of the girder of one ton to the foot, the relative weights under these conditions would be as follows:—

Span.	Weight of steel girder. Tons.	Weight of iron girder. Tons.
200	57	100
300	150	300
400	320	800

Again, taking such a case as that of the Menai Bridge, which consists of two spans of 500 ft. over the navigable waterway. This structure is composed of four wrought iron tubular girders, each weighing about 1,500 tons, or 6,000 tons in all, and in order to avoid the difficulties of scaffolding, each of these tubes was built on the shore, floated off on pontoons, and lifted bodily into its place by hydraulic machinery. This great work was erected when the application of wrought iron to engineering works was in its infancy, and when wrought iron was the only available material for such a purpose. With such materials only at command, and in the then state of knowledge of structures, the accomplishment of this bridge, capable as it is of carrying railway trains across clear spans of 500 feet, was an achievement far in advance of the time in which it was done, and worthy of the name of its great designer, ROBERT STEPHENSON. But if this work had to be constructed now, and were made an open girder of steel instead of plate iron, the weight of metal required would be little more than one-third of that used, and the cost of erection, the time required for its execution, and the total cost of its construction would be most materially reduced.

It is not alone in the relative weight or in the relative cost that the advantage of the stronger material is important, but with steel we shall be enabled to cross openings which are absolutely impracticable in iron. It will naturally be asked why it is that steel is not used in these structures, if such manifest advantages would result from its employment. The reason is two-fold:—(1) There is a want of confidence as to the reliability of steel in regard to its toughness and its power to resist fracture from sudden strain; (2) steel is produced of various qualities, and we do not possess the means, without elaborate testing, of knowing whether the article presented to us is of the required quality for structural purposes. A third reason, arising probably out of those before mentioned, is found in the fact that in the regulations of the Board of Trade relative to railway structures, although rules are given for the employment of cast iron and wrought iron, steel has not, up to the present time, been recognised or provided for.

Now, as regards the question of toughness and malleability, and referring again to Mr. KIRKALDY's experiments, it appears that in the tests of "Bessemer steel" eighteen samples were tried under tensile strain, the length of the samples being in round numbers 50in., and the diameter 1·382in.; and that when these were subjected to ultimate strain, the elongation at the moment of fracture was in the most brittle example 2¾in., but generally varied from 4½in. to 9½in. In the experiments on transverse strain, in which the bars were nearly 2in. square and only 20in. between the points of support, all the "Bessemer steel" samples, except two, bent 6in. without any crack. Again, in the experiments made by the committee on bars 14ft. long and 1¼in. in diameter, out of twenty bars of the milder quality of steel, sixteen extended more than 8in., and of these ten extended more than 12in.

As another example of the malleability of steel, I may mention that I have seen a piece of rail, weighing 80lb. per yard, and 12ft. in length, held by one end and twisted at the other, until it made six and three-quarter complete revolutions before it broke. The fracture occurred at one end, leaving about 11ft. of the rail in the twisted form which had been given to it. In this twisted state the rail was laid on two bearings 3ft. 6in. apart, and subjected to the blow of one ton weight falling 30ft. and it bore one of these blows without breaking. I have also used a considerable quantity of steel rails, the test to which they were subjected being one ton falling 20ft. on a 3ft. 6in. bearing, and out of the whole number tested there was not one which broke with this test. The effect of the blow was to produce a set of about 4½in.; and if the rail was then reversed and struck on the other side, it became nearly straight again. As a rule, the rails yielded to the third blow; but I have seen seven blows given without producing fracture. On the other hand, five of the bars tested by the committee were of inferior malleability. We have also instances in which steel rails break with the jar produced in being thrown off the wagons on to the ballast; and there is no doubt of the fact that steel is made and sold which is cold-short, and not reliable for use for engineering purposes. This irregularity appears to arise mainly from the difference in the chemical constituents of the metal or ores employed, or in the process pursued by different makers.

Another element of uncertainty appears to be that, in these modern and rapidly made steels, the precise time allotted to the several stages of the process, the degree of heat employed, and a variety of other circumstances, have to be carefully observed, and any inaccuracy in carrying out the required conditions affects the quality of the steel produced. Nevertheless it is known that in the Bessemer process, if ores or metal of suitable chemical qualities are used, and the process of manipulation is properly performed, the quality of metal produced is certain and regular in its results. In the processes of Dr. SIEMENS there is not the same necessity for purity in the ore or metal required, the nature of the process being, I believe, such as to eliminate some of the ingredients which would prevent toughness being obtained, while tests may be made during the process of manipulation so as to ascertain that the metal is of the quality sought before it is run off into the ingot mould. Where large castings and metal of great solidity are required, as in making large guns, there is the method pursued by Sir J. WHITWORTH, whereby the metal is intensely compressed while in a fluid state. The pressure employed is twenty tons per inch, and its effect in producing solidification is such as to shorten the ingot about 1½in. for every foot of length. The treatment by compression is especially important where metal is required in large masses and of great ductility, because the larger the mass and the greater the ductility, the larger and more numerous are the air-cells, and the effect of the pressure is to completely close these cells and render the metal perfectly solid. By this process mild steel can be made with a strength of forty tons to the inch, having a degree of ductility equal to that of the best iron. The more highly carbonized qualities, whose strengths range from forty-eight up to seventy-two tons per inch, show a decrease of ductility somewhat in the same ratio as the strength increases.

TO BE CONTINUED.

Awards at Cincinnati.

THE following are the awards at the Cincinnati Exhibition, in class 24, in iron and steel:—Best cast steel, Miller, Barr & Parkins, silver medal; best boiler iron, Burgess Steel and Iron Works, gold medal; best merchant bar iron, Gaylord Rolling Mill Company, silver medal; best hoop iron, J. F. Hazen, agent, silver medal; best assorted sheet iron, McCulloch Iron Company, silver medal; best assortment of wire, Cleveland Rolling Mill Company, silver medal; best cut nails, W. G. Robinson, bronze medal; best wrought spikes, Gaylord Rolling Mill Company, bronze medal; best horse shoes (hand made), Wm. Russell & Company, bronze medal; best iron wire, Globe Rolling Mill Company, silver medal; best plow steel, Cincinnati Steel Works, silver medal.

THE COAL TRADE.

NEW YORK, Oct. 17, 1873.

For the first time in several months the coal trade appears to really suffer a check. Business is quite flat, especially in manufacturing circles, and the extent of the weakness is shown by the fact that the regular monthly advance will be intermitted in November on manufacturing sizes. At present it is intended to advance somewhat on domestic sizes; but there is some expectation that prices will hardly maintain themselves in November. Production is reported to have already been considerably restricted, and it is quite likely that the companies whose united action has earned for them the name of "the combination" will consult their common interest and make a *pro rata* restriction of product. How much coal will be offered at the Scranton sale cannot be ascertained at present; but if the stories which are afloat concerning the condition of the trade are all true, the buyers at the auction are more likely to have their way than the sellers.

The cause of the trouble is of course due to the condition of the manufacturing interests; but the general dullness in that line is not thought to be due to an overextension of facilities for manufacture, nor to a falling off in the real demand for goods, but chiefly to the fact that manufacturers are looking forward to a reduction of wages, and are unwilling to make stocks of goods which must be sold on another basis of prices. Of course, this expectation affects the merchants, who will buy as little as possible until they work off their present stocks. Demand is therefore weak, and short time, or even complete stoppages, are the order of the day in factories all over the country. It is to be regretted that this state of things should come on just at the beginning of winter, but it is one that has been certain to appear sooner or later on our way back from the inflated values consequent upon the war. Gold was last week lower than it has been before in eleven years, and foreign exchange sells so poorly that foreign States are sending us gold to pay for our grain. At the same time the export of gold, which is so large an item in our trade, is stopped, and greenbacks are increasing in value every day. It is this time of change which makes business so dull. Even were laborers to consent to an immediate and general re-adjustment of wages, it is hardly probable that the demand for goods would return to its old proportions. There must be time given to merchants to make the most they can out of their circumstances. These things do not look very well for the coal trade, but the prosperity of the summer, and the fact that undue competition is to a great extent restrained by the union of the great companies on one line of policy will lessen the evil effects of the stringency. It is better to do no business for the rest of the season than to sell at the lowest limit, with the consciousness that prospects become worse as the quantities of coal moved increase.

In the Bituminous trade business is dull, though, so far, there seems to be less impression made upon this branch than upon anthracite. Prices are down somewhat, and may be quoted at $7.25.

Anthracite Coal Trade for 1873 and 1873.

The following table exhibits the quantity of Anthracite Coal passing over the following routes of transportation for the week ending, 1873, Oct. 11, compared with the week ending Oct. 12, 1872.

COMPANIES.	1872. WEEK.	1872. TOTAL.	1873. WEEK.	1873. TOTAL.
Phila & Reading R.Rt..	94,971	3,695,208	107.519	4,102,441
Schuylkill Canal	21,588	670,884	19 617	607,7.7
Lehigh Valley R. R. ..	55,165	2,612,416	61,705	2,782.?79
Lehigh & Sus. R. R.....	23,093	1 318 173	48,034	1,588,309
" " Canal	24,562	6c6,215	27,349	663,519
Scranton North.....	23,160	690,218	17,772	725,187
" South	32,910	1,657,211	49,093	1,670,317
Penn. Coal Co., rail.....	26,733	934,6-9	25,059	980,817
" " " canal....	239	5.(3i	246	6 801
Del. Had C.Co. Canal	....	1,122,073	....	1,135,469
" " East...	....	427 5?8	....	322,139
" " West..	....	307,710	....	4.8,413
" " South.	....	296 912	....	154,321
Shamokin.....	13,053	4.6,821	14,7.6	506,435
Trevorton.....	...	....	....	....
Lykens Valley Coal Co....	....	....	....	....
Wyoming North.....	....	....	...	....
Wyoming South.....	....	....	....	....
P. N. Y. C. & R. R. Co..	12,746	501,.05	13,771	610,779
Williamstown Col'y.....	....	.....	....	....
Big Lick Col...	....	.....	....	....
Total..	331,217	15,217,765	354,945	16.254,850
1872.....			331,2.7	15,217,765
Increase			53,728	1,037,085
Decrease.....				

These figures are for the week and fiscal period commencing Nov. 30.

† For coal transported for Company's use and Bituminous coal.

We have not been able this week to obtain the tonnage of the Delaware and Hudson Canal Co.

Bituminous Coal Trade, 1873 and 1873.

The following table exhibits the quantity of Bituminous Coal passing over the following routes of Transportation for the week ending Oct. 11, 1873, compared with week ending Oct. 12, 1872.

COMPANIES.	1872. Week.	1872. Year.	1873. Week.	1873. Year.
C. & O. Canal.....	15,115	517,311	21,637	510,767
B. & O. R. R.	24,614	9.6,959	32,419	1,154,565
Penn. S. Line.....	....	.....	3,329	80,055
H. & B. T. R. R.....	6,414	236,708	11,744	364,805
*Harrisburg & D.....	9,519	382,656	8,289	265,398
*L. V. R. R....	582	23,162	683	24,396
P. & N.Y.C. & R. Co.....	6,215	296,683	6,401	251,081
{Cumberl'd Branch Canal.	4,495	173,660	4,738	106,473
" Railroad....	939	16,431	1,408	70,572
Total.....	67,893	2,623,000	90,648	2,828,112
	....		67,893	2,623,000
Decrease.....	....			
Increase	....		22,755	205,112

Penn. and N. Y. R. R.—Coxton, Pa.

Coal tonnage for week ending Oct. 11, 1873.

	Week. Tons. Cwt.	Total. Tons. Cwt.
Anthracite received:		
From Lehigh Valley R. R.....	12,12? 11	417,999 02
" Lack. & B. R. R.....	634 14	35,759 16
" Pleasant Valley R. R.....	52 03	127,057 00
" Sul. & Erie R. R.....	955 03	29,962 14
Total.....	13,770 11	610,778 12
Same time last year	12,745 15	501,605 01
Increase	1,024 16	109,173 11
Decrease.....		
Distributed:		
To Lehigh Valley R. R.....		24,004 13
To Lack. & B. R. R.....		1,443 0?
To S. Central R. R.....	3,5?0 07	136,409 04
To Ithaca & A. R. R.....	2,819 17	126,266 17
To Erie R. W. Pockets for shipm't.	5,445 03	223,378 19
To Erie R ilway, Wat'ins direct..	264 03	10,379 12
To individuals on line of road....	570 07	24,744 09
To points at & above Coxton for use of Co.....	616 16	22,816 13
To points between Waverley and Elmira.....	493 18	41,335 00
Total.....	13,770 11	610,778 12
Bituminous received from BARCLAY R. R.		
Shipped north from Towanda.....	6,267 14	248,859 11
Shipped south from Towanda.....	75 06	1,883 07
Northern Central R. R.....	58 00	338 09
Total.....	6,401 00	251,081 07
Same time last year.....	6,215 09	296,0?2 19
Increase		
Decrease.....	185 11	45,001 12
Distributed:		
To Erie Railway.....	5,949 08	227,309 16
To So. Central R. R.....	318 06	21,009 15
To Ithaca Valley R. R.....	62 17	470 15
Lehigh Valley, R. R.....	....	1,016 01
To individuals on line of Railroad.	70 09	1,156 16
To points on line of road for use of Company.....	....	118 04
Total.....	6,401 00	251,081 07
Grand totals transported		
Anthracite.....	13,770 11	610,778 12
Bituminous.....	6 401 00	251,081 07
Total.....	20,171 11	861,859 19
Same time last year	18,961 04	797,6?8 00
Increase	1,210 07	64,171 19
Decrease	.....	

Pennsylvania Coal Company.

Shipments of Pittston Coal for the week ending Oct. 11, 1873.

	1873. WEEK.	1873. YEAR.	1872. WEEK.	1872. YEAR.
By Railway.....	25,058 19	980,817 06	26,?42 17	939,688 18
" Canal.....	241 01	6 800 14	233 19	5,034 07
... .	25,299 00	987,618 00	26,971 16	944,723 05
Increase, 1873 .	42,894 15			

Statement of Coal Transported over Cumberland and Pennsylvania Railroad

During the week ending Saturday Oct. 11, and during the year 1873, compared with the corresponding period of 1872.

WEEK.

	C. & O. C'l Tons. Cwt.	B. & O. R. R. Tons. Cwt.	Pa. S. Line Tons. Cwt.	Total. Tons. Cwt.
1873.....	21,636 11	32,418 11	2,329 03	57,384 05
1872.....	15,1-5 04	24,631 11	....	39,?28 15
Increase....	6,521 07	7,805 00	2,329 03	17,655 10
Decrease.	....	.....	....	

YEAR.

1873.....	510,?66 14	1154561 08	80,054 14	1,745 386 16
1872.....	517,311 05	976,959 03	....	1,494,270 08
Increase.....	.....	177,606 05	80,054 14	251,1?6 08
Decrease.....	6,544 11	....	....	....

Cumberland Branch R. R.

WEEK.

	To C. & O. Canal. Tons. Cwt.	To B. & O. R. R. Co. Tons. Cwt.	Total. Tons. Cwt.
1873.....	4,?31 02	1,408 05	6,146 07
1872.....	4,494 11	938 14	5,433 05
Increase.....	243 11	469 11	713 02
Decrease.....	.....	.....	.....

YEAR.

1873.....	106 473 10	70,5?2 06	177,045 16
1872.....	173,660 02	16,431 10	190,091 12
Increase	.....	54,140 16	
Decrease.. . ..	67,186 12		13,045 16

Philadelphia & Reading Railroad and Branches.

COAL TONNAGE

For the Week ending Saturday, Oct. 11, 1873.

BY RAILROAD.—ANTHRACITE.

PASSING OVER MAIN LINE AND LEB. VAL. BRANCH.

	Tons. Cwt.
From St. Clair. - - - - - - - - - -	37,681 17
" Port Carbon. - - - - - - - - - -	4,850 07
" Pottsville. - - - - - - - - - -	4,451 11
" Schuylkill Haven. - - - - - - - - - -	35,992 03
" Pine Grove. - - - - - - - - - -	6,380 07
" Tamaqua. - - - - - - - - - -	13,103 16
" Harrisburg. - - - - - - - - - -	61 19
" Dauphin. - - - - - - - - - -	5,025 18
Total - - - - - - - - - -	107,548 18

FOR SHIPMENT BY CANAL.

Passing Frackville Scales - - - - - - -	8 258 07
" Mill Creek " - - - - - - -	960 11
" Schuylkill Valley Scales - - - - - - -	988 04
" Mt. Carbon - - - - - - -	826 13
" Cressona " - - - - - - -	7,199 04
" Pine Grove " - - - - - - -	....
" Tamaqua " - - - - - - -	2,655 09
Total - - - - - - - - - -	20,888 08

SHIPPED WESTWARD VIA CATAWISSA AND WILLIAMSPORT BRANCH AND NORTHERN CENTRAL RAILROAD.

Via Catawissa & Williamsport Br. - - - - -	620 08
" N. C. R. R. passing Locust Gap. - - - -	497 14
" " " Shamokin. - - - -	4,985 09
" " Herndon. - - - -	....
Total - - - - - - - - - -	6,103 11

SHIPPED WEST OR SOUTH FROM PINE GROVE

Via Schuylkill & Susquehanna R. R. - - - -	1,706 13
" Lebanon & Pine Grove Branch - - - - -	905 02
Total - - - - - - - - - -	2,611 15

CONSUMED ON LATERALS.

From Frackville Scales. - - - - - - -	1,020 09
" Mill Creek " - - - - - - -	261 10
" Schuylkill Valley Scales. - - - - - - -	187 16
" Mt. Carbon " - - - - - - -	964 17
" Cressona " - - - - - - -	754 07
" Pine Grove " - - - - - - -	84 18
" Tamaqua " - - - - - - -	454 01
Total - - - - - - - - - -	3,727 08

LEHIGH AND WYOMING COAL.

Received via Silverbrook Junction, Sent East - -	10,267 13
" " Cat. & Wpt. Br. Sent West - -	....
" " Rupert, Cat. & Wpt. Br. - - -	100 01
" " Allentown R. Penn'a Br. - - -	72 02
" " Alburtis, " " - - - - -	....
" " Oreland, G. & N. Br. - - - -	1,083 09
" " Willow Street R. R. - - - -	200 00
Total - - - - - - - - - -	11,613 05

BITUMINOUS.

rom Harrisburg. - - - - - - - - -	8,289 00
" Connecting R. R., G. & N. Br. - - - -	....
" Junction R. R. - - - - - - - -	20 00
Total - - - - - - - - - -	8,289 00

COAL FOR COMPANY'S USE.

Anthracite - - - - - - - - - -	6,615 19
Bituminous - - - - - - - - - -	252 10
Total - - - - - - - - - -	6 868 09

RECAPITULATION.

	Total for Week.	Corres-p'g week last year.	Increase and Decrease.
Passing over Main Line and Leb. Val. Branch - - -	107,548 18	94,970 15	i 12,578 03
For Shipment by Canal - -	20,888 11	21,340 02	d 451 14
Shipped Westward via Northern Central R. R. - - -	6,103 11	7,700 19	d 1,597 08
Shipped West or South from Pine Grove - - - -	2,611 15	1,725 08	i 886 07
Consumed on Laterals - -	3,727 08	3,943 19	d 216 11
Lehigh and Wyoming Coal -	11,813 05	2,006 00	i 9,807 05
Total Anthracite p ying freig't	152,693 05	131,687 03	i 21 006 02
Bituminous - - - -	8,289 00	9,518 11	d 1,?29 11
Total of all kinds paying freig't	160,982 05	141,205 14	i 19,776 11
Coal for Company's use - -	6,868 09	6,033 17	i 8.9 12
Total Tonnage for Week - -	167,850 14	147,244 11	i 20,606 03
Previously this year - - -	5345,60 10	5037181 03	i 308,579 07
Total to date - - - -	5513611 04	5184425 14	i 329,185 10

SHIPPED BY CANAL.

From Schuylkill Haven -	17,410 00	18,413 10	d 1,003 10
" Port Clinton - -	2,207 00	2,1?4 00	i 53 00
Total Tonnage per Week -	19,617 00	20,567 10	d 950 10
Previously this year -	588,090 09	654,269 05	d 66,178 16
Total to date - -	607,707 09	674,836 15	d 67,129 06

Delaware and Hudson Canal Company.

Coal mined and forwarded by the Delaware and Hudson Canal Company for the week ending Saturday, Oct. 11, 1873.

	WEEK.	SEASON
North.....	13,945 18	2,106,973 19
South.....	3,328 00	157,?59 00
Total 1873.....	17,273 18	2,264,732 19
Corresponding time in 1872:		
North...	45,663 17	2,015,799 01
South.....	7,999 06	304,910 14
Total. 1872.....	53,663 03	2,320,699 15
Increase North.....	8,?82 01	91,184 18
Decrease No.th.....		
Increase South.....		
Decrease South.....	4,671 06	147,151 14
Increase	3,610 15	.....
Decrease.....	.....	55,966 16

Northern Central Railway, Shamokin Division.

Below is the return of Coal sent over the Shamokin Division of the N. C. R. W., for the 7 days ending Oct. 11, 1873.

	Tons.	Cwt.
East.....	627	15
West.....	14,107	19
		14,735 14
Same time last year.....		13,053 00
Increase.....		1,682 05
Decrease.....		
Total amount shipped to date.....		506,435 03
Same time last year.....		26,520 17
Increase.....		05,614 06
Decrease.....		

Report of Coal Transported over Lehigh Valley Railroad

Report of coal tonnage for the week ending Oct. 11, 1873, with Totals to date, compared with same time last year.

WHERE SHIPPED FROM.	WEEK. Tons. Cwt.	TOTAL Tons. Cwt.
Total Wyoming	17,012 17	740,527 19
" Hazleton	46,204 01	1,875,7 7 09
" Upper Lehigh	67 03	2,420 19
" Beaver Meadow	12,519 17	565,167 07
" Mahanoy	15,334 13	441,838 16
" Mauch Chunk	111 10	3,748 16
Total	91,840 03	3,629,630 17
Same time last year	76,775 16	3,332 437 03
Increase	15,064 07	297,223 14
Decrease	.....	.....
Forwarded East from Mauch Chunk by rail	61,704 13	2,782,179 00
Same time last year	55,164 12	2,617,416 04
Increase	6,540 01	169,762 16
Decrease	.....	.....

DISTRIBUTED AS FOLLOWS.

Local East of Mauch Chunk	2,054 03	67,365 18
Forwarded East for use L. V. R.	1,251 09	45,437 12
Delivered to Furnaces and Manufacturing Companies	12,114 09	593,549 16
Delivered to Cat & Fog. R. R	308 16	5,881 07
" " East Penn R. R.	109 13	8,058 18
" " North Pennsylvania Railroad	6,098 15	274,227 11
" " Port Del	5,917 14	176,491 08
" " East Amboy Railroad	.....	.....
" " Morris and Essex Railroad	5,073 07	238,868 10
" " Bel. Del Railroad	20,445 01	9 6,158 16
" " Central Railroad	8,231 07	465,779 04
Delivered at and above Mauch Chunk for use of L. V. R.R.	1,262 03	58,869 13
To P. & N. Y. R. R	12,128 11	417,191 02
To Northern Central R. R.	3,888 02	20,155 17
To D. H. & W. R. R.	628 17	28,797 11
To L. & S. R. R. at Packerton for rail	555 02	17,491 17
To Individuals at Mauch Chunk	61 15	2,128 07
To Individuals above Mauch Chunk	599 05	13,086 01
To L. &S. R. R., at Penn Hav., for railroad	.....	1 541 10
Do. for canal	7,518 10	186,314 06
To Lehigh Canal Mauch Chunk	3,484 05	65,287 19
To Catawissa Railroad	.....	55 00
To L. & B. R.R. at Lack. June	15 00	69,732 14
Total	91,840 03	3,629,630 17

Report of Coal Transported over the Lehigh Canal

For the week ending Oct. 10, 1873.

REGIONS SHIPPED FROM.	TIDE. tons. ct.	LOCAL. tons, ct.	TL. WEEK tons cwt.	TL. DATE tons, cwt.
Mauch Chunk Region	3,549 13	4,760 19	8,310 12	187,482 08
Mauch Chunk Region Hazardville	284 06	100 04	384 07	21,511 18
Beaver Meadow Region	591 13	3,954 03	4,545 16	169,570 04
Mahanoy Region	.....	868 17	868 17	17,824 15
Hazleton Region	1,783 11	6,715 03	8,498 14	158,432 15
Upper Lehigh Region	.....	1,071 14	1,071 14	25,086 14
Wyoming Region	2,423 18	1,204 13	3,658 11	81,377 13
Wyoming Region, Hazardville	.....	.....	.....	4,282 09
Total	8 673 01	18,675 10	27,348 11	603,518 12
Previously reported	206920 04	369219 17	576,170 01	.....
Total to date	215593 05	387925 07	603,518 12	.....
Corresponding week last year	241696 01	384318 13	626,214 14	.....
Increase	.....	.....	.....	.....
Decrease	26,302 16	3,606 14	22,696 02	.....

DISTRIBUTION.	WEEK 1873.	WEEK 1872.	YEAR. 1873.	YEAR. 1872.
Consumed on line of Lehigh Canal	3,070 00	1,600 08	62,566 06	60,549 07
Passed into Morris Canal to Tidal Points	67 16	.....	2,268 17	4,68) 15
Passed into Morris Canal to Local Points	693 03	864 05	25,093 19	19,943 05
Passed into Del. & Rar. Canal to Tidal Points	8,605 05	9,875 00	213,424 08	237,215 06
Passed into Del & Rar. Canal to Local Points	491 12	188 18	10,610 07	12,005 12
Consumed on line Delaware Div. Canal	1,287 02	1,656 00	35,431 15	38,366 09
Passed through to Bristol	13,143 13	10,176 18	254,117 10	253,455 00
	27,348 11	24,562 03	603,518 12	626,214 14

Report of Coal Transported over Central R.R. of N. J. (Lehigh and Susq. Div.)

Week ending Oct. 11—Compared with same time last year

REGION SHIPPED FROM.	TIDE. tons ct.	LOCAL. tons ct.	CANAL. tons ct.	TL. WEEK tons cwt.	TL. DATE tons, cwt.
Wyoming	27207 11	8810 19	3465 11	39484 01	1396445 03
Upper Lehigh	341 01	2573 05	991 01	3905 07	154515 11
Beaver Meadow	4846 17	3068 15	8222 07	10777 19	257098 02
Hazleton	.....	469 00	7419 03	7888 03	166315 13
Mauch Chunk	2672 05	2941 13	8744 02	14308 00	456675 13
Total	34717 14	17803 12	23842 04	76263 19	2425050 02
Prev'ly reported	1119868 19	740594 04	488223 09	2348686 12	.....
Total to date	1154586 13	758397 16	512065 13	2425050 02	.....
Same time 1872	924878 11	671802 10	402915 02	1999596 03	.....
Increase	229708 02	86595 06	109150 11	425453 19	.....
Decrease	.....	.....	.....	.....	.....

DISTRIBUTION.	WEEK 1873.	WEEK 1872.	YEAR 1873	YEAR 1872.
Forwarded East by Rail to Tidal points	34717 14	15253 10	1154586 13	924878 11
Forwarded East by Rail to Local points	11539 12	6254 03	355160 02	325450 08
Forwarded East by Rail use Central Division	1797 03	1519 16	69546 02	61097 11
Forwarded East by Rail use L. & S.	.....	64 09	9013 02	6746 06
Delivered at and above Mauch Chunk	1329 08	1431 03	6255) 15	45609 18
Delivered at Coalport & Hazard for Canal	23842 04	14578 11	546152 16	444777 00
Delivered to L. V. R. R. at Packerton	303 16	156 17	19135 01	11333 02
Delivered to L. V. R. Rd. at Sugar Notch	2787 09	.....	76752 11	.....
Delivered to L. & B. R. R.at Plymouth Bridge	46 04	3740 01	132153 00	179703 /
Total	76363 10	42996 10	2425050 02	19995 03

Delaware Lackawanna & Western Rail Road Company.

Coal transported on the Delaware, Lackawanna, & Western Railroad for the week ending Saturday, Oct. 11, 1873.

	WEEK. Tons. Cwt.	YEAR. Tons. Cwt.
Shipped North	17,772 10	755,1?6 18
Shipped South	49,093 06	1,670,337 13
	66,865 16	
Total		2,425,524 01
For the Corresponding time last Year :		
Shipped North	23,160 07	600,218 06
Shipped South	35,910 02	1,657,210 15
Total	59,070 09	2,257,429 01
Increase	7,724 07	168,095 00
Decrease	.....	.....

Lykens Valley Coal Company.

Shipments of coal from Lykens Valley Coal Co., for week ending Oct. 11, 1873.

For week ending Oct. 11, 1873	2,372 02
Total shipment to date	37,906 10

Prices of Coal by the Cargo.

[CORRECTED WEEKLY.]

Company Coals.

Oct. 1873.

	L.	Str.	Gra.	Eg.	Sto.	Chest
Pittston at Newburgh	5 10	5 00	5 10	5 20	5 50	5 60
*Lackawana at Rondout	5 25	5 35	5 45	5 50	5 80	5 20
Wilk'b're at Pt. John'n	5 00	5 15	5 25	5 40	5 60	5 05
Old Co. Lehigh at Pt. John'n	6 10	5 85	5 85	5 95	5 20	— —
New York Coal Exchange	6 00	5 85	5 85	5 95	5 20	— —

AT PHILADELPHIA.

Hard White Ash	4 60	4 60	4 70	4 70	4 90	3 95
Free B'rn'g White Ash Coal	4 60	4 60	4 70	4 70	4 90	3 65
Schulkill Red Ash	— —	— —	4 70	4 85	5 05	3 95
Alaska Red Ash	— —	— —	4 70	4 70	4 90	3 95
Shamokin White Ash	— —	— —	4 80	5 00	5 10	4 10
North Franklin	— —	— —	5 10	5 10	5 00	4 00
Lorberry	— —	— —	5 35	5 35	5 35	4 35
Lykens Valley	— —	— —	— —	6 10	6 10	4 75

SHIPPED FROM ELIZABETHPORT, HOBOKEN AND TRENTON.

L. C. and N. Co., Newport	— —	— —	5 35	5 50	5 70	5 10
" " Plymouth Red Ash	— —	— —	5 35	5 60	5 80	5 10
" " Room Run	5 85	— —	5 70	5 70	5 95	5 15
Honeybrook Lehigh	5 90	— —	5 90	5 95	5 90	5 20
Fulton, "	6 00	— —	5 85	5 95	5 95	5 20
Scranton	4 85	5 10	5 20	5 55	5 85	5 00

For freights to different points see "Freights."
*To contractors only.

Prices at Baltimore—Oct. 1873.

Wholesale Prices to Trade.

Wilkesbarre, by cargo or car load	$6 00@6 25
Pittston and Plymouth, do	5 75@6 00
Shamokin Red or White Ash, do	6 00@5 25
*Lykens Valley Red Ash, do	@6 55
By retail, all kinds per ton of 2,240 lbs	7 50@8 50
*George's Creek and Cumberland f. o. b. at Locust Point for cargoes	4 85@5 00
West Va. and Youghigheny gas f. o. b. at L. Point	6 50
Kanawha Cannel, coarse	@12 50

* Freight to New York $2 15.

BITUMINOUS COALS.

Kittaning Coal Co.'s Phœnix Vein, f. o. b. at Phila	$
Lemon " " "	
Cumberland Vein Coal	
Tyreonnel f. o. b.	$7 00

Prices at Georgetown, D.C., and Alexandria, Va.

Oct. 1873.

George's Creek and Cumberland f. o. b. for shipping	$4 60@4 75

Prices at Havre de Grace, Md.

Oct. 1873.

Wilkesbarre and other White Ash for Cargoes	$— —@5 00
Lykens Valley	— —@5 25
Shamokin Red or White Ash	— —@6 50

Bituminous Coals (Cumberland).

Georgetown, F.o.b.	$4 00
Baltimore "	5 00
New York "	7 50
South Amboy "	6 50

Prices of Foreign Coals.

Oct. 1873.

Duty 75 c. per ton.

Corrected weekly by ALFRED PARMELE, No. 32 Pine street, N. Y.

Liverpool Gas Oaking	16 00@18 00
" " Cannel	17 00@— —
" House "	20 00@21 00
" Orrel	20 00@— —

Per ton 2,240 lbs., ex-ship.

PRICES FROM YARD.

Liverpool House Orrel, screened	$20 00@22 00
"Cannel, "	22 00@25 00

Per ton 2,000 lbs. delivered.

Prices of Gas Coals.

Oct. 1873.

PROVINCIAL.

Corrected weekly by Louis J. Belloni, Jr., 41-43 Pine st., N. Y.

	Coarse	Slack
Block House, f. o. b. at Cow Bay	$2 75	$1 25
Gowrie	2 25	0 00

Corrected by Bird, Perkins & Job, 27 South street.

	Coarse.	Culm of Coal.
Pictou	nett $3 00	1 50
Sydney	3 25	1 00
Langan	2 75	1 00
Caledonia	2 75	1 25

A discount from the prices of the coarse Coal on purchase of 5000 tons and upwards. Duty on all slack coal or Culm : 40c. per ton of 28 bushels, 80 pounds to the bushel. On all bituminous coal or shale :75 cents per ton of 28 bushels.

AMERICAN.	Nominal quo Currency.
Vmoreland f. o. b.	$9 00 @7 00
rmount Gas Coal Co. of N. Y. "	6 50 @7 00
espard Coal Co. "	6 50 @7 00
Penn. "	6 50 @7 00
Newburg Orrel Gas "	6 50 @7 00
West Fairmount Gas Coal "	6 50 @7 00
Redbank Cannel, at Pa "	12 00 @0 00

AT PHILADELPHIA.

Foreign and Provincial Freight

Oct, 1873.

Foreign.
Newcastle and Ports on Tyne, per keel of 21 1-5 tons £
Liverpool, 3 per cent primage

TO NEW YORK.

Provincial.

Sydney	
Lingan	$5 00
Cow Bay	4 00
Port Caledonia	4 00
Little Glace Bay	4 00

TO BOSTON.

Sydney	3 50
Lingan	3 50
Cow Bay	3 50
Port Caledonia	3 50
Little Glace Bay	3 50

TO MONTREAL.

Caledonia	3 75 gold

TO CUBA.

Ca.edonia	9 50 gold.

Freights.—Oct. 1873

TO EASTERN PORTS.	Cumberland. From Georgetown.	Cumberland. From Baltimore	Anthracite. From Elis. Port Johnston, Weehawken, and Hoboken.	Anthracite. From Newburgh.	Anthracite. From Rondout.
Amesbury	— —	— —	— —	— —	— —
Bangor	— —	3 50	2 05	— —	— —
Bath	— —	2 90	— —	— —	— —
Boston	3 10	2 75@2 90	2 10*	2 20	2 25
Bridgeport	— —	2 40	1 60	1 15	1 20
Bristol	— —	— —	1 85	— —	— —
Cohasset Narrows	— —	— —	— —	— —	— —
Derby	— —	— —	1 25†	— —	— —
Dighton	2 75	— —	— —	— —	— —
East Cambridge	— —	— —	2 10	2 20	2 30
Fall River	2 60	2 40@2 60	1 30	1 45	1 50
Hackensack	— —	— —	— —	— —	— —
Hartford	— —	3 25	1 50	1 70	1 75
Hoboken	2 15	— —	50	— —	45
Jersey City	2 15	— —	50	— —	65
Lynn	— —	— —	— —	— —	— —
Middletown	— —	— —	1 25	— —	1 35
Mystic	— —	— —	1 30	— —	1 50
New Bedford	— —	2 60@2 75	1 45	— —	1 65
Newburyport	— —	3 10	2 35	— —	2 35
New Haven	— —	2 40	1 00	1 15	1 20
New London	— —	2 40	1 20	1 35	1 40
Newport	— —	— —	1 30	1 45	1 50
New York	2 30	2 15	50	— —	65
Norwalk	— —	2 75	1 00	1 15	1 40
Norwich	— —	2 80	1 30	1 40	1 45
Pawtucket	— —	2 90	1 40‡	— —	1 65
Portland	3 10	2 90	1 95	— —	— —
Portsmouth, N. H	3 25	3 00@3 10	2 15	— —	— —
Providence	2 65	2 40@2 60	1 35	1 45	1 50
Rockport	— —	— —	— —	— —	— —
Saco	— —	— —	— —	— —	— —
Sag Harbor	— —	— —	1 25	— —	— —
Salem	— —	2 90	2 10	— —	2 25
Stamford	— —	— —	1 00	— —	— —
Stonington	— —	— —	1 25	— —	— —
Taunton	— —	— —	1 85	— —	— —
Warren	— —	— —	1 35	— —	— —
TO RIVER PORTS					
Albany	— —	2 60	— —	— —	— —
Catskill	— —	— —	— —	— —	— —
Cockeackie	— —	— —	— —	— —	— —
Coeyman's	— —	— —	— —	— —	— —
Cold Spring	— —	— —	— —	— —	— —
Fishkill	— —	— —	— —	— —	— —
Haverstraw	— —	— —	— —	— —	— —
Hudson	2 60	2 50	— —	— —	— —
New York vessels	— —	— —	— —	— —	— —
Nyack	— —	— —	— —	— —	— —
Poughkeepsie	— —	— —	— —	— —	— —
Rhinebeck	— —	— —	— —	— —	— —
Rondout	— —	— —	— —	— —	— —
Saugerties	— —	— —	— —	— —	— —
Sing Sing	— —	— —	— —	— —	— —
Stuyvesant	— —	— —	— —	— —	— —
Tarrytown	— —	— —	— —	— —	— —
Troy	— —	2 65	— —	— —	— —
West Point	— —	— —	— —	— —	— —
Yonkers	— —	— —	— —	— —	— —

† 3 c. per bridge per ton in addition to freight.
‡ New Haven rate and towing 25 c. extra per ton.
‡ Towing from Providence and return, extra.
‖ And Towing.

St. Thomas	$— — Gold
Martinique	— — "
Demerara	— — "
New Orleans	— — "
Mobile	— — "

Rates of Transportation to Tide Water.

BY RAILROAD.

TO PORT RICHMOND, PHILADELPHIA.

Philadelphia and Reading Railroad, from Schuylkill Haven Lump and St., net, $1 60; Br., Egg and Ch., $1 65; Stove, $1 75
Shipping at Pt. R., 20c., for use at Phil., $2 18 from Pt. Carbon,

MAUCH CHUNK TO ELIZABETHPORT.

L. V. Railroad from Mauch Chunk to Phillipsburgh	$0 72
C. R. R., N. J., Phillipsburgh to Elizabethport	06
Shipping expenses at Elizabethport	25
Wharfage	10
Total	$2 23

MAUCH CHUNK TO PORT JOHNSTON.

L. V. R.R., or L. & S. R. R. from M. C. to Phillipsb'g	$0 72
C. R. R., of N. J., Phillipsburgh to Pt. Johnson	1 06
Shipping expenses	25
Wharfage	10
Total	$2 23

TO HOBOKEN

L. V. R. R., Mauch Chunk to Phillipsburgh	72
Morris & Essex R. R. Phillipsburgh to Hoboken	6
Shipping expenses	25
Wharfage	00
Total	$2 23

TO SOUTH AMBOY.

L. V. R.	
R. & D. R. R.	$1
Cam. & Am. R. R.	
Shipping Expenses	35
Total	$2 23

PENN HAVEN TO ELIZABETHPORT.

L. V. R R. Penn Haven to Phillipsburgh	84
C. RR. of N. J. Phillipsburgh to Elizabethport	1 06
Shipping expenses	15
Wharfage	20
Total	$2 25

MARKET REVIEW.

NEW YORK, Oct. 17, 1873.

IRON.—Scotch Pig is without material change. The bulk of the iron sold from speculators' hands is now offered at low prices for cash, but in the present dull state of the market it is very difficult to place; we quote Eglinton at $41@$41 50, Glengarnock $42@$42 50, and Coltness (in small stocks) $48; time sales are completely ignored, and we understand that great scrutiny is exercised as to cash purchases, as in several cases parties selling for cash have had considerable difficulty in closing the account on account of the tightness of the money market. American Pig continues depressed, and we understand that were it not for the large stocks of coal and ore on hand and contracted for, many furnaces would have to blow out; at present they keep working, increasing their stocks, and looking for better times; the prospect, on the whole, seems to be far from cheering. There is nothing doing in Rails of any description. Scrap is without movement, being offered at $37 ex ship, without finding buyers; 90 tons Wrought and Cast sold on private terms. Refined Rar from store is unchanged—demand moderate. Russia sheet is firm at 18@18¼ cents gold.

SCOTCH IRON.—The following is Messrs William Colvin & Co.'s weekly report, dated Glasgow, Sept. 30:—The warrant market, which closed this day last week steadily at 112s. 6d., became much weaker, and on Thursday the price was 108s. Since then there has been a steadier tone, the price fluctuating between 110s. 112s. To-day the market has been quiet, with a drooping tendency, business being done from 111s. 6d. to 110s., closing with sellers at 110s., and buyers 109s. 6d. The foreign demand is decidedly quiet.

	No. 1.	No. 3.
G. M. B., at Glasgow	114s. 0d.	110s. 6d.
Gartsherrie, do.	125s. 0d.	120s. 0d.
Coltness, do.	127s. 6d.	116s. 0d.
Summeriee, do.	117s. 6d.	112s. 0d.
Carnbroe, do.	120s. 0d.	112s. 0d.
Monkland, do.	115s. 6d.	112s. 0d.
Langloan, at Port Dundas	120s. 1d.	114s. 0d.
Glengarnock, at Ardrossan	120s. 0d.	115s. 0d.
Eglinton, do.	115s. 0d.	112s. 0d.
Dalmellington, do.	115s. 0d.	112s. 0d.

(The above deliverable alongside)

Bar Iron and Nail Rods £13

LEAD.—Pig is very quiet, and we have only to notice small sales at 7 cents for Spanish, and 6¼@6¾ for Domestic, gold. Bar 9¼ cents, Sheet and Pipe 10½, and Tin-lined Pipe 16½, less 10 per cent. to the Trade.

COPPER.—The demand for Manufactured Copper and Yellow Metal is very light, but prices are unchanged; we quete Sheathing Copper 38 cents, Bolts and Braziers 40, Bronze and Yellow Metal sheathing 26, and Yellow Metal Bolts 32, net cash. The business in Ingot continues to be confined to such small lots as are immediately wanted and that can be picked up at low prices; in this way we notice sales of 75,000 lb. Lake at 24¼@24½ cents. 10,000 lb. old Brass and Copper sold on terms not made public.

STEEL.—The demand is moderate, and prices are steady, with a moderate supply of foreign. American is unchanged.

SPELTER.—It still neglected; Silesian is held at 7¼@7½ cents gold, and American 8¼@8¼ currency.

TIN.—Pig remains very dull and depressed, and prices still yield. Straits may be quoted nominally for lots from store 29½@30 cents, English 27, and Refined do. 28¾@29 gold. A sale has been made of about 1000 slabs Straits to arrive at Boston, supposed at 28½@29 cents gold. The last London quotation for Straits was £122. Plates are without further quotable change, but the market is exceedingly dull; 250 bxs. Charcoal Tin sold at $10; we quote them $9,52½@$10 25, Coke Tin $7 75@$8 37½, Coke Terne $7@$7 87½, and Charcoal Terne $9 50@$9 75, all gold.

ZINC.—Mosselmann Sheet is quiet and steady at prequotations, for lots from agents' hand. Dealers are selling at 8¼@8¾ cents net, gold. Zinc Sheet 9½; Manganese black oxide 3½ cents; do. Gray per oxide 6 cents. High grades of Pyrolusite are not found in the market, and even those of the black oxide, between 70 and 80 per cent., are scarce.

METALS.

NEW YORK, Oct. 16, 1873.

IRON.—Duty: Bars, 1 to 1¼ cents ℔ lb; Railroad, 10 cents ℔ 1c lbs.; Boiler and Plate, 1¼ cents ℔ lb; Sheet, Band, Hoop, and Scroll, 1¼ to 1¾ cents ℔ lb; Pig, $7 ℔ ton; Polished Sheet, 3 cts. ℔ lb; Galvanized 2½; Scrap Cast, $6; Scrap Wrought, $8 per ton. All less 10 per cent. No Bar Iron to pay a less duty than 35 per cent. ad val.

	Store Price.
Pig, Scotch—Coltness ℔ ton	48 00@— —
Gartsherrie	46 00@— —
Glengarnock	44 00@42 50
Eglinton	41 00@41 50
Pig, American, No. 1	40 00@41 00
Pig, American, No. 2	30 00@35 00
Pig, American, Forge	28 00@31 00
Bar Refined, English and American	— —@— —
Bar Swedes, assorted sizes gold	— —@137 50

	Store Prices, Cash.
Bar, Swedes, 1¾ to 5 x ⅜ & ⅞ 2 sq. & 6 to 12 x ⅜ & ¾	175 00@— —
Bar, Refined, ¾ to 2 in. rd. & sq. 1 to 6 in. x ⅜ to 1 in.	92 50@— —
Bar, Refined, 1¼ to 6 by ¼	87 50@— —
Bar, Refined, 2½ to 2⅝ round 1 & 1¼ by ¼ & 5-16	90 00@— —
Large Rounds	92 50@107 05
S roll	102 50@135 00
Ovals and half-round	110 50@130 00
Band	102 50@105 00
Horse Shoe	117 50@— —
Rods, ¼ to 3-16 inch	92 50@135 00
Hoop	120 00@160 00
Nail rod	— @ 9
Sheet, Russia, as to assortment (gold)	18 @ 18½
Sheet, Singles, D. and T. Common	—5¾@— 7
Sheet, D. and T. Charcoal	—7 @— 8¼
Sheet, Galv'd, list 13 per cent, discount	— —@— —
Rails, English (gold), ℔ ton	62 00@ 63 00
Rails, American, at Works in Pennsylvania, currency	70 00@ 75 00

COPPER.—Duty: Pig, Bar, and Ingot, 5; old Copper 4 cents ℔ lb; Manufactured, 45 per cent. ad val.

	All Cash.
Copper, New Sheathing, ℔ lb	— @— 38
Copper, Bolts	— @— 40
Copper Braziers, 16oz. and over	— @— 40
Copper Nails	— @— 45
Copper, Old Sheathing, &c. mixed lots	21 @— —
Copper, Old, for chemical purposes, 14@16 oz.	— @— —
Copper, American Ingot, Cash	24¼@— 24½
Copper English Pig	— @— —
Yellow Metal, New Sheathing & Bronze	— @— 26
Yellow Metal Bolts	— @— 32
Yellow Metal Nails, Sheathing and Slat'g	26 @— —

LEAD.—Duty: Pig, $2 ℔ 100 lbs.; old Lead, 1½ cents ℔ lb Pipe and Sheet, 2½ cents ℔ lb.

Spanish (gold)	— —@7 00
German, do.	— —@7 00
English do.	— —@7 00
Foreign, Refined	7 25 @7 50
Domestic do.	6 62½@6 75
Bar (net)	9 25 @— —
Pipe (net)	— —@10 50
Sheet	— —@10 50

STEEL.—Duty: Bars and ingots, valued at 7 cents ℔ lb or under 2½ cents; over 7 cents and not above 11, 3 cents ℔ lb; over 11 cents, 3½ cents ℔ lb, and 10 ℔ cent ad val. Store prices.

English Cast (2d and 1st quality) ℔ lb	— 18½@— 23
English Spring (2d and 1st quality)	— 9¾@— 10½
English Blister (2d and 1st quality)	— 14 @— 18½
English Machinery	— 14½@— —
English German (2d an 1st quality)	— 12½@— 14½
American Blister "Black Diamond"	— —@— 11½
American, Cast, Tool do.	— —@— 17
American, Spring, do.	— —@— 11
American Machinery do.	— 11½@— 12
American German, do	— 9 @— —

TIN.—Duty: Pig, Bars, and Blocks, 15 ℔ cent. ad val.; Plate and Sheets and Terne Plates, 25 ℔ cent.; Roofing 25. ad val.

	Gold ℔ lb.
Banca	33 @33½
Straits	29½@30
English	27 @—
English Refined Gold	28¾@29

PLATES. Fair to Good Brands.	Gold.	Currency
I. C. Charcoal, ℔ box	$ 9 62½@10 25	$11 25 @11 75
I. C. Coke	8 00 @ 8 50	9 25 @ 9 75
Coke Terne	7 00 @ 7 87½	8 25 @ 9 25
Charcoal Terne	9 50 @ 9 75	11 00 @11 25

SPELTER—Duty: In Pigs, Bars & Plates, $1.50 p. 100 lb

Plates, Foreign (gold) p. 100 lb.	7 25 @—7 75
Plates, Domestic p. lb.	8¼@—11

ZINC—Duty: Pig or Block, $1.50 per 100 lb.; Sheet 2½c. per lb

Sheet	per lb.—8½ @10

American Institute of Mining Engineers.

OFFICIAL BULLETIN.

Announcements to Members and Associates.

I. The ENGINEERING AND MINING JOURNAL, which is the Organ of the Institute, and contains its proceedings, transactions and notices of meetings, will be sent to each Member and Associate on the payment of his annual dues. Back numbers cannot, as a rule, be sent.

II. Dues are payable in advance at the annual (May) meeting. Remittances should be made, as far as possible, by P. O. Order, payable to the Secretary.

III. The first volume of Transactions of the Institute is in course of preparation and will be sent, as soon as issued, to all members not in arrears.

IV. The regular October meeting of the Institute will be held in Easton, Pa., on Tuesday, October 21st, beginning at 7 o'clock P. M. Authors of papers are requested to notify the Secretary in advance of the subject and length of their papers.

Members will rendezvous at the United States Hotel.

WM. FIRMSTONE,
J. C. KENT,
J. M. SILLIMAN,
Local Committee of Arrangements.

THOMAS M. DROWN, Secretary.
1123 Girard street, Philadelphia, Pa.

San Francisco Stock Market.

BY TELEGRAPH.

NEW YORK, Oct. 17, 1873.

We have advices from the San Francisco Stock Board, dated the 16th inst. The most noteworthy item in the report is the advance in Crown Point, it being quoted at $105 per share—an advance of $45, as compared with our last. The list is as follows:

			Oct. 17.
Savage	—	—	40
Crown Point	—	—	105
Yellow Jacket	—	—	51
Kentuck, "New Issue"	—	—	11
Chollar Potosi	—	—	37½
Gould & Curry "New Issue"	—	—	11½
Belcher "New Issue"	—	—	66
Imperial	—	—	3¾
Raymond & Ely	—	—	61
Meadow Valley	—	—	16½
Eureka G. V.	—	—	20
Ophir	—	—	—
Hale and Norcross	—	—	—

MISCELLANEOUS.

World Exposition,

VIENNA, 1873.

The Council of Presidents of the International Jury awarded only *Ten Honorary Diplomas* (the highest distinction) to the German Empire for the Class, Construction of Machines.

One of these Honorary Diplomas was awarded to the

Maschinenbau Actien Gesellschaft Humboldt,

Formerly Sievers & Co., in Kalk, near Deutz am Rhine, for their efficiency in the

CONSTRUCTION OF MACHINES FOR MINES, DRESSING OF ORES, AND SMELTING HOUSES,

But especially for their

ROCK-BORING MACHINES and PNEUMATIC FORCE PUMPS.

The qualities of which were not even approximately equalled by those of other competitors.

J. W. HARDEN & SON,

MINING ENGINEERS,

430 *Walnut Street, Philadelphia.*

Coal and Iron Ore properties reconnoitred and reported on. General plans, Working drawing, and Estimates of Mining structures and Machinery supplied. Periodical underground Surveys made and kept up. Geological and Geographical Surveys made. Aprit 22.1y

RICHARD P. ROTHWELL,

MINING ENGINEER,

ROOMS 107, 108, 109,

71 Broadway, New York.

COAL AND IRON A SPECIALITY.

P. O. Box 2187 N. Y.

EDWARD SAMUEL,

Iron Broker and Commission Merchant,

332 WALNUT STREET, PHILADELPHIA.

Solicits consignments and orders to purchase or sell American or Foreign Raw or Manufactured Irons.

Dec, 31:tf

THOMAS M. DROWN,

ANALYTICAL CHEMIST

AND

CONSULTING METALLURGIST.

1123 GIRARD STREET.

PHILADELPHIA.

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THE ENGINEERING AND MINING JOURNAL.

ROSSITER W. RAYMOND, Ph. D.
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THE results attained at Vienna, both favorable and unfavorable, have the greatest importance in view of our own approaching Exposition; and, no doubt, there will be careful reports upon, and thorough discussion of, the subject. Dr. BARNARD, President of Columbia College, who has just returned from Vienna, gave the result of his observations at the first meeting of the Polytechnic Branch of the American Institute, on Thursday evening. He said there should be a better system of classification; objects of similar kind belonging to different nations should be grouped together. Everything should be labeled to avoid the loss of time consequent upon consulting different catalogues, and the admission fee should give unrestrained freedom inside the buildings. He believed that no more temporary exhibitions would be held; they didn't last long enough to pay a profit. To succeed they must be permanent, and the exhibitors must be allowed to sell their wares. Prof. JOY, who has had similar opportunities for observation, concurred in the criticisms of Dr. BARNARD.

IF we are to believe the *Iron World*, a company of English capitalists have purchased a tract of coal land in Washington County, Pa., for $100,000, and intend to mine coal for shipment to England, by way of the Mississippi. Our contemporary may have definite information of such a sale, but the story appears to us more likely to be another of those rumors which the air of journalism has been so full of lately. When it was proposed to send anthracite to England it was found that there could not be ships enough procured to make a business, and the large sales of soft coal reported to have been made in foreign markets were fully disproved by the fact that the records of commerce showed no such marked diversion of merchant ships from their voyages as must have taken place had the rumors been well founded. Some sales were undoubtedly made, but they were small, when not seen through Madame Grundy's spectacles. The extreme length of the voyage from Pennsylvania to England *via* the Mississippi should, we think, be a consideration sufficient to dispel any hopes of direct traffic between that State and England in the soft coal of the western counties. Even if 35 cents a bushel can be obtained in England, the cost of transportation—which would probably be higher for coal than for grain, because colliers would have more difficulty in procuring return cargoes—must necessarily deprive the miner of all profit.

TO SOME of our readers, this number of the JOURNAL will come in time to notify them once more of the unusual combination of attractions at Easton, on the 21st instant. We hope that all who can attend the meeting of the Institute, which begins that day, will do so; and especially that they will go early enough to take part in the inaugural ceremonies in the Pardee Scientific Department of Lafayette College. A hearty recognition of the enlightened liberality of Mr. PARDEE, and a participation in the enthusiastic tribute which will be rendered to him on that day by throngs of his fellow-citizens, is the least that can be expected from the members of a profession which his generous endowments have especially benefited. ARIO PARDEE has never "made capital" out of his own generosity, or sought opportunities of listening to his own praise. But it is well that, for once in his life, he will be compelled to see himself as others see him, and to receive, not the servile adulation of beneficiaries, but the honest, manly congratulations of all who are attempting in any way to serve the cause he has so steadily and wisely advanced by his judicious liberality.

As we have already announced, the inaugural address will be delivered on Tuesday morning at half-past ten o'clock, in the large auditorium of Pardee Hall; a collation will be served to the assembled guests at one o'clock; the key of the building will be delivered by Mr. PARDEE to President CATTELL at 2 o'clock; and addresses will be made by several distinguished speakers, among whom we may name the venerable Professor HENRY, of the Smithsonian Institution, and President GILMAN, of the University of California. In the evening the building will be lit up and thrown open for the inspection of visitors, and there will also be a social reception at the house of Mr. PARDEE. It is expected that the first session of the Institute of Mining Engineers, which takes place the same evening, will be so brief as to permit the members to take part in these attractive entertainments. On the following day, the more exciting festivities of the occasion being over, the Institute will settle to its regular work.

Pepper's Steel.

MR. CALVIN PEPPER, of New York, is the inventor of a process for making silicon steel. From Mr. PEPPER's description of his process we may fairly acknowledge that the name given to the product is not a mere catch-penny term, but is derived from the method he pursues. But whether the product is really a silicon steel, is another question; and as, according to opinions which are derived from practice and have long stood the test of experience, it is almost impossible to make silicon combine with iron by Mr. PEPPER's process, we have preferred to call the steel by the name of the inventor, rather than by one which would be a *quasi* acknowledgment of its asserted composition.

That we do not lightly object to using the name silicon steel in this instance, will be understood by our readers when we say that the method of manufacture consists merely in heating ordinary wrought iron to redness, or better, to whiteness, in contact with quartz sand. The inventor takes rolled bars, made from puddled iron, or Bessemer iron, either over blown or not, and placing them in a crucible with pure white quartz sand, and nothing else, heats them until in a few hours they are converted into steel. There are two questions which naturally occur in reference to this process: First, is the product steel? As to that, we can only say that we have seen some samples said to have been made by that process, which seemed to be steel, but no analyses have been made, and there have been no thorough tests made so far as we know. Still, acknowledging, for the time, that steel is really the result of the above operation we come to: second, is it *silicon* steel? On this point there is positive testimony. Mr. PEPPER is not obliged to confine himself to crucible work. He can heat his bars in a heap of sand, or in large boxes, such as are used for making the ordinary cement steel, with equal results. Thus his method is precisely parallel to that called cementation, where wrought iron bars are heated in charcoal; and to that other called oxidizing cementation, where cast iron bars are heated in sand. Both these processes are well known, and records exist of experiments and analyses made by celebrated authorities to ascertain what the course of the operation is. Let us see what the conclusion is in regard to silicon. PERCY, quotes an analysis, by Dr. MILLER, of the cast iron used in oxidizing cementation and of the steel—or malleable cast iron—which resulted. It is as follows:

	Cast iron.	Malleable metal.
Combined carbon	2·217	0·434
Graphite	0·583	0·446
Silicon	0·951	0·409
Sulphur	0·015	0·000

This proves that when cast iron is heated in sand, silicon does not enter the iron, but, on the contrary, passes out of it, or at least is oxidized to silica. In fact, the whole operation is one of oxidation, and its history shows that it is one of the few metallurgical processes which in the very early days of the science were established, because theory pointed to their propriety. Now-a-days we have many operations in which theory has preceded practice; a century ago they were rare. But now comes Mr. PEPPER, and says that this process, which was invented as an oxidizing process, is a reducing one, for he claims that silica is reduced in it to silicon. Either his claim is unfounded, or there must be some substance which leaves the iron to unite with the oxygen of the silica, and is, in turn, replaced by the silicon thus reduced. What that is we are at a loss to know. It cannot be carbon, for in that case the cast iron would show a decided increase of silicon instead of a decrease; for there is much more carbon present in the cementation of cast iron than in Mr. PEPPER's process. His explanation is, we think, sufficient reason for not acknowledging at once the correctness of the name given to the product by the inventor.

Mr. PEPPER has issued a circular which he has sworn to, but which, we trust, will not be brought into court on the Judgment Day. He says, for instance, that if it is desired to heat a metal beyond its fusing point, *without fusion*, all

that is required is to place it in sand and heat the sand! The explanation of this phenomena is as follows:

Siliceous sand absorbs heat even more readily than water; and being itself infusible without a flux, the metal, if without a flux, takes on the same condition of infusibility according to closeness of contact between the metal and sand, both alike being indestructible by heat.

Other extraordinary discoveries are:

The only use of fluxes in reducing ores is because in the ordinary process a sufficient fusing temperature cannot be obtained of itself to effect the reduction. Siliceous sand, as a menstruum, can be made to give forth such a degree of heat in the cupola of the furnace, as of itself to effect the reduction of any ore. I claim this as my discovery and invention.

I hold that the caloric, or, as I now term it, stimuli or heat power, is applied to the sand reproductively, and given forth again with increase, and hence the sand without a flux has no assignable limits of temperature. I hold and claim as my discovery and invention, that the cheapest and best medium for any metallurgic purpose requiring high temperature is siliceous sand; and that heated as the menstruum in any furnace, convertor or other receptacle, or over, beneath or around any fire of a forge, is the cheapest, best, and for protracted operations will prove the quickest heating medium that can be possibly used for reducing ores, for smelting metal, for refining or purifying metal, for heating iron, for making steel, than any other agency or medium that can be used.

I obtained Letters Patent of the United States, for heating by radiation from sand surface whatever the fuel used. The constitutional difference between the hardness of carbon steel and silicon steel, is as that between ice and glass, the equivalent expressions of carbon steel being Fe. C. O_2, and of silicon steel being Fe. Si, O_3.

Of course Mr. PEPPER's steel, like some others in the inventive stage, can be made in perfect purity from the most impure ores, is not affected by heat, cold or oxidation, will weld to itself, or to iron, and is in short a concentration of all virtues.

But it may be asked, why are such pretensions gravely alluded to and discussed in this journal? It is because the new (?) steel is to be made the subject of manufacturing operations, and the assertions which read so absurd to those who understand the subject are gravely made and solemnly sworn to. They belong to the history of invention in steel making, and if they do not assume importance it will not be because of lack of faith in the inventor, whom we know to be thoroughly persuaded that what he has sworn to is true.

American Scientific Schools.

THE scientific schools of the country have now begun their Fall Session, and so far as we have heard, with flattering prospects. Indeed, every year demonstrates the increasing popularity of these institutions over those which provide only the so-called "liberal education." We do not mean to say that this is a thing to be unhesitatingly commended, for the educational question is not one to be lightly settled, and it is one in which judgment is so narrowed by personal experience, that there are comparatively few who are fitted by both liberal and scientific training to act the part of an unprejudiced referee. But while there may be a question as to the effect upon those students who abandon a liberal education, which they would otherwise have taken, for a purely scientific one, there is no doubt whatever that technical schools are of the greatest benefit to those who would have gone into the practice of industrial pursuits without training of any kind, had there been no schools of science. We believe, too, that this class forms a much larger proportion of those who attend the technical institutions, and that the number of those who have foregone a regular college course to study some branch of science is much smaller than is commonly supposed. Where colleges have founded a successful school of science, the strength of the parent institution does not seem to be materially altered, however great the growth of the scientific branch.

Columbia College in New York is an example. The school of mines there seems to be the most popular institution of the kind in the country, and the number of its students in the tenth year of its foundation, will considerably exceed that in the college itself. The school opens the first term with about 140 students, of whom just about one-half are new; while the college classes, probably, do not contain more than 125 men, of whom in the neighborhood of fifty are new. But though the school is better patronized than the college, the opinion we have expressed concerning the relations of the two classes of institutions is borne out by the fact that both are more than usually well patronized this year. If schools of science tend to lessen the number of young men who sought a liberal education, we should see the college diminished in strength this year, instead of partaking in the improvement which is manifested by the school.

In other respects the School of Mines shows signs of solid strength. While it has more students than ever before the number of special students—those who confine themselves to one branch of study—is only 15, or considerably less than ever before. This fact not only indicates a greater disposition among young men to seek a general scientific training, which, considered as a means of mental discipline and growth, corresponds closely to the liberal education of colleges, but it also proves a greater proficiency among the students, for experience shows that special courses are taken not so much because of a positive inclination to confine the attention to one pursuit as a fear that the student will not be able to complete the full course with credit and success. This improvement in the grade of students undoubtedly arises in part from an improvement in the schools, which serve as feeders to the schools of science. The latter, by creating a demand for better instruction in lower institutions, have produced it.

Other schools of technical instruction show equal prosperity this year. The Technological Institute of Boston has more than 300 pupils. The Greene School of Science, connected with Princeton College in New Jersey, begins its career with 13 students, an entirely favorable showing. Its building—designed by a gentleman formerly connected with the New York School of Mines, and containing the latest improvements in arrangement and apparatus—is not yet completed. The Pardee School, connected with the Lafayette College in Easton, is already established in a fine and costly building, and its neighborhood to a great manufacturing region will undoubtedly give it an increasing support.

We have touched only upon those schools which are established near New York. They are quite enough to show how strong is the tide of favor which is steadily rising around the institutions where young men learn to perform the work of life with intelligence and discretion. Their success makes it evident that this country is entering upon a history similar to that which has marked technical work in England since the great International Exhibiton held in London. It cannot fail to have important results to this country in the constant rivalry of nations, just as it has had the most profound effect upon the standing of British manufactures.

The Smelting of American Ores in Germany.

FOUR German works—those of Clausthal, Andreasberg, Mansfeld and Freiberg—are united in the reception and treatment of ores from foreign mines. We have already given complete descriptions of the processes at Clausthal and Freiberg. They are type methods, quoted in all books of metallurgy, and standing as examples of practice. The method pursued at Andreasberg is the same as that of Clausthal, with some alterations to suit the special circumstances of the place. The mines which long supplied the works have for years been nearly exhausted and the furnaces have been employed in remelting old slag, containing from 6 to 20 per cent. of lead. The ore formerly treated was exceptionally rich in silver, and contained a large quantity of arsenic, so that the part Andreasberg plays in the combination of smelting works, is to treat rich and arsenical ores. We have no record of changes made since the importation of ore from North America began, the latest accounts being those which Dr. WEDDING officially gives of the practice in 1871. Some points in the experience had that year are worth reproducing, and, as it is doubtful whether any serious changes have been made in the general method of work, the following may stand for the present process.

In the year 1871, importation was neccessarily disturbed by the war with France and, as we said before, the great dealings with United States mines had not begun. Only 137 tons of foreign ore, mostly from Mexico and South America, were treated with 381 tons of home ore and 2369 tons of slag. The ores are smelted raw, with basic slags from the Oker copper works. This slag contains more than 70 per cent. of oxide of iron, which is partially reduced in the shaft furnace, the iron taking sulphur from the lead ore, and three products are the result, (1) metallic lead, (2) a compound called matte which contains the sulphur of the ore and the iron which has combined with it, and finally (3) the slag. This matte contains lead as well as iron, and must be roasted to remove its sulphur and then smelted again with fluxes to remove the iron and leave the lead. The whole treatment is, in fact, but a repetition of the Clausthal process, described on page 34 of the present volume.

There is, however, one point of difference. At Andreasberg the ore is divided into two sorts, (1) containing gold and (2) free from gold, the charges for which are as follows:

	Containing Gold.	Free from gold.
Ore	100	100
Lead Scraps	75	50
Copper Slag	20	48
Roasted Matte	29	31
Slag from the same operation	287	211
Coke	70	61
or percentage of charge	13½	14
Furnace smelts in 24 hours	14,520 lb.	14,630 lb.

It will be noticed that both charges contain a remarkably large addition of diluting slag, the reason for which is that the ores are very refractory. The addition of lead is regulated by the richness of the ore. One pound of silver is covered when the ores

contain 0·2—0·5 per cent. silver, by 200 lb. lead.
" 0·5—1 " " 100 "
" 1 " and over 100–50 "

The latter of these amounts appears rather hazardous but the slag is sufficiently poor to be thrown away, and the matte is not too rich. Some smelters in this country have fancied that when ores containing both gold and silver were smelted together there was a greater loss of gold in the slag than of silver. The contrary conclusion has been reached at Andreasberg, where the slag is found to contain a much smaller proportion of the gold than of the silver. This result, which tallies with observations made at other European works, is undoubtedly correct, and corresponds to the known behavior of gold, both as a metal, oxide and sulphide. The error of the American metallurgists probably arose from the vicious mode of estimating assays by money value instead of by weight. If the weights were equal the money value of the gold would be more than fifteen times that of the silver.

Some very interesting examinations into the relative proportions of gold and silver obtained from foreign ores in the various operations have been made at Andreasberg. The silver contained in the lead obtained from the ore-fusion, from the matte-fusion, from the slag, and finally from the flue dust, was assayed for gold with the following results:—

100 silver direct from the ore contained 0·887 gold.
from the matte " 0·140 "
from the slag " 0·277 "
from the flue dust " 0 300 "

It is remarkable that the ores taken from the Andreasberg mines give very different results. They contain less gold than the American ores, and it is probably in a finer condition, or else combined with more arsenic. At all events, the silver from the matte contains three times as much gold as that from the ore, while with foreign ores the directly extracted silver contains six times as much gold as the silver from the matte. The Andreasberg ores give a silver of which

100 parts extracted direct from the ore contain (2 assays) 0·018 & 0 010 gold.
from the matte " " 0·070 & 0·024 "
from the slag " 0·10

Averaging the double assays of the Andreasberg silver, we can compare the two results as follows :

	Foreign ores.	Andreasberg ores.
Silver from ore contained of gold.....	68	20 per cent.
matte " "	10·7	66 "
slag " "	21·3	14 "
	100	100

The slag has the following composition :

	Ores containing gold.	Ores free from gold.
Iron oxide.....	13·7	24·7
Alumina.....	19·5	15·3
Lime.....	12·6	8 8
Magnesia.....	7·1	6·6
Copper sub-oxide.....	—	0·27
Lead oxide.....	1·2	1·25
Silica.....	42·5	40 9
Silver.....	0 0025	0 0030

The matte, when sufficiently rich in copper, is roasted and smelted with the following charge :

Roasted matte.....	100
Lead scraps.....	38
Ore slag.....	170
Smelted in 24 hours.....	13300 lb.

The slag from this operation resembles that from the ordinary Hartz mattes, and contains :

Iron oxide.....	38·50
Other bases.....	26 98
Copper sub-oxide.....	0·50
Lead oxide.....	3·55
Silver.....	0·003

The matte is roasted in kilns connected with a system of condensation canals, in which a flue dust is obtained which consists chiefly of arsenious acid, containing only 4·2–6·6 per cent. lead and 0·006 per cent. silver. It is probably to this arsenic that the behavior of the gold is due.

From the 518 tons of ore and 2,369 tons of lead slag treated in 1871 there was extracted 40 lb. of gold, 8,340 lb. silver, 39 tons antimonial lead, 152 tons work lead, 7½ tons b'ack copper ; 3 foremen and 53 workmen were employed.

At Altenau, where in 1871 about 100 tons of Mexican ore were received, the charges were made up in such a manner as to contain 26 per cent. lead and 0.2 per cent. (59 oz. to the ton) silver. The work lead obtained from the foreign ores contained 0·0003—0·0004 per cent. (1-12th—1-9th oz. to the ton) gold. This concentrated partly in the abzug drawn off the desilverizing kettle when the lead was melted down, and partly in the first zinc crust.

CORRESPONDENCE.

Hot Blast.

OFFICE OF THE CEDAR POINT IRON CO.,
PORT HENRY, ESSEX CO., N. Y., Sept. 29, 1873.

TO THE EDITOR .—SIR—I notice that you are still under the impression that I. LOTHIAN BELL still adheres to the theories in regard to superheated air advanced in his "Chemical Phenomena," and his more recent work noticed under the head of "New Publications" in last week's JOURNAL. As the Cedar Point Iron Company is the first to adopt the Whitwell Stoves in this country, I hasten to lay before you information, perhaps not possessed by you, relating to their adoption by different companies.

I am informed that Mr. BELL, at the recent meeting of the Iron and Steel Institute, expressed grave doubts of the soundness of his theories and conclusions in relation to the use of superheated air. At all events, you will notice he has altered his opinions enough to enable him to contract with Mr. WHITWELL for eight stoves for two furnaces now being erected by the Walker Iron Works, Newcastle-on-Tyne (BELL BROTHERS). There is one fact that stands out in bold relief against all conflicting theories, and that is, that the No. 4 Consett Furnace does make more iron with from four to five cwt. less coke per ton, than the Clarence Furnaces using Mr. BELL'S theoretical temperature.

Yours truly, T. F. WITHERBEE.

The Pardee Building at Easton.

ONE of the most attractive features of the meeting at Easton, as the members of the Institute know, will be the dedication of the new building erected through the generosity of Mr. PARDEE for the scientific department of Lafayette College. This building is already occupied by the classes, and will be dedicated on Tuesday, October 21. A circular descriptive of it, says :

"This magnificent structure cost over TWO HUNDRED AND FIFTY THOUSAND DOLLARS, and is the princely gift of Mr. ARIO PARDEE, the founder of the Scientific Department of the College. It consists of one center building five stories in height, fifty-three feet front and eighty-six deep, and two lateral wings one on each side of the center building, measuring sixty-one feet in length and thirty-one in width ; four stories in height, including a mansard roof, the whole terminating in two cross wings forty-two feet front and eighty-four feet deep, and four stories in height. The entire length of front, in a straight line, is two hundred and fifty-six feet. The material is the Trenton brown stone, with trimmings of light Ohio sand stone. It is heated throughout by steam and lighted by gas. The first floor is mainly devoted to the study of mining and metallurgy ; the second contains the geological and mineralogical cabinets, a spacious auditorium, and smaller lecture rooms, reading rooms, and professors' studies. The third floor is devoted to the engineers. The right wing is occupied by the mining engineers. A large drawing room occupies the lateral wing, while the cross wing embraces rooms for models and various professional purposes. The left wing is occupied by the civil engineers. The lateral wing comprises a drawing-room, and the cross wing is divided into rooms for lectures, working models, collections, and the like. On the fourth floor the same ample provision has been made for the chemists. The center building is divided into two large rooms, one for technical collections, and the other an assistant's room. The lateral wings are intended for quantitative and qualitative analysis. The cross wings at the extremity of the building are occupied by additional laboratories, lecture rooms, and professors' studies. The fifth floor of the center building is mainly occupied by laboratories for original researches. In determining what rooms were needed and the best arrangement of them, similar buildings, in Europe as well as in this country, were studied, and liberal provision has been made in all the departments of instruction for every aid which has been devised for the most thorough and attractive teaching, and also for the prosecution of original researches. The formal dedication of such a noble building, equalled but by few college edifices in our country, will be an event of the greatest interest not only to the Alumni and friends of the College, but to all who are interested in educational matters."

Ice Gorges.

MR. JOHN MURPHY read a paper before the Franklin Institute, upon the ice-gorge in the Schulkill above Fairmount, last winter, in which he drew some important conclusions. He said the ice-gorge in the Schulykill, at Turtle Rock, extending backwards up the stream some seven miles in distance, has attracted a good deal of attention. The fear of the effect of the sudden disgorge of this enormous mass of ice has given grave apprehension to the citizens of Philadelphia. The Fairmount Dam is in danger. If it gives way, damage and destruction follows. Market street, Chestnut street, and the partially completed South street bridges will be swept out of existence. There is nothing, therefore, that engineering skill can, or has devised, that can withstand this terrific gorge if once in motion. Think for a moment of a field of ice some miles long, seven hundred feet wide and twenty feet deep, moved by a freshet such as would send it crashing its way against every obstruction that impeded its progress! Now the purpose of this paper is to show that this gorge of ice is, in fact, the protection to all structures below it.

Ice is gorged under two conditions of the stream ; the first condition is when the stream is rising, the other is when the water falls. Persons who are accustomed to look upon the breaking up of ice in the river, and seeing masses of ice moved by a freshet, rarely comprehend the difference between an ice-gorge that may last for a moment, for an hour, or for two hours, and then break away by force of a continually rising current, and a gorge of ice that has been stranded upon the bottom of a river, where the freshet runs away from it, and leaves high and dry.

In the latter case, the first portion of the ice floe is stopped, and jammed against the shores. The water running from underneath it allows it to sink to the bottom. The ice following after accumulates behind, piling in upon the stranded obstruction in front. The subsidiary water fails in strength to move forward the obstruction, and only gives opportunity to make the barrier stronger.

An observation of the ice-gorge above the dam at Fairmount shows us that each cake of ice has been set down to the bottom of the river edgewise. As evidence of it, any one who will glance at the surface of it will see that every stick of wood, débris and logs, and all light floating material stand upright, as though an engineering party had been driving stakes to make a topographical survey of the territory.

A gorge of ice is always an evidence of a falling stream, in fact, it may almost be said a season of drought (low water). Consequently, before a gorge can be raised, and moved to be destructive to structures below it, there must be a volume of water poured into the stream at least three times greater than the initial freshet that caused the gorge.

If ice weighs 58 pounds, and water 62½ pounds to the cubic foot, it will be clear that the difference in flotation will be as 58 is to 62½ ; in other words, one-sixth in round numbers will be out of water, and five-sixths will be submerged. Now, where a freshet occurs and carries with it a mass of ice, five sixths of which is under water and one-sixth above, whatever be the thickness of the ice, it carries with it elements of great destruction ; because the specific gravity of ice is so near to that of water, that when it has great thickness and velocity, it acts against any obstruction like a projectile. An ice-gorge and an ice-freshet are widely different, for in the case of the ice-freshet the horizontal mass, whatever may be its thickness, is raised from its normal condition and moved forward by the flood.

Referring, then, to our thought, that five-sixths of the ice is below the surface of the water, and, if it be in a condition of flotation, it will require a freshet of 16 feet, measured on the Dam of Fairmount, to move the gorge bodily. I therefore conclude that no danger may be apprehended below any gorge similarly situated as the one above the Dam at Fairmount.

Voisin and Dronier's Salt for Exciting Galvanic Batteries.

THE inconvenience of transporting a large quantity of solution for exciting bichromate batteries lead CHUTAUX, in 1871, to attempt the preparation of a solid bichromate salt, such that it is only necessary to dissolve a sufficient quantity in water and use it. He succeeded to a certain extent by taking equal parts by weight of water, sulphuric acid and bichromate of potash, and then evaporating almost to dryness.

VOISIN and DRONIER, of Paris, on the contrary, considered the subject from the point of chemical equivalents, and so combined the substances entering into the salt that the whole of the oxygen in the chromic acid is made use of. Their results have been very satisfactory, as will be seen from the following experiments:

There were originally several salts at the disposal of the experimenters, but, after numerous experiments, a single salt was settled upon, which has the formula:

$$NaO, SO_3 + 7 S_3 O HO + KO, 2 Cr O_3.$$

This salt, it will be seen from the formula, contains sulphate of soda, which plays no part, or at most a very unimportant one, in the chemical process of exciting the electricity; but its presence is necessary in order to form, with the bichromate and sulphuric acid, one of those solid compounds of sulphuric and chromic acids which were discovered by GAY LUSSAC, and which alone could solve the problem which VOISIN and DRONIER had undertaken. Sulphate of soda can, in fact, to a certain extent be considered as an acid bearer; and when it is combined with seven equivalents of sulphuric acid and one of bichromate of potash, to form a solid body, this product will be split up when thrown into water; the sulphuric and chromic acids are set free, just as if the solution had been prepared directly with sulphuric acid. It will be seen, also, from the formula of this salt, that it contains the number of sulphuric acid equivalents which are necessary to render available all the useful oxygen of the chromic acid, so that after the battery is entirely exhausted a double sulphate of potash and chromium is found at the negative electrode; but this compound is not chrome alum, because the chromium is all present as protoxide and not as sesquioxide. In fact, after the battery has been used a certain length of time, the solution turns green, then more and more blue, without depositing any crystals of chrome alum, and the carbon plates are never covered with a deposit of the alum. Messrs. V. and D. are of the opinion that the formula of their salt, according to its mode of preparation, is:

$$KO, 2 SO_3 + Na O, 2 SO_3 + 2 Cr O_3, 2 SO_3 + 7 HO.$$

The proportions given by them for this salt are 20 grams salt to 100 grams water, or one to five. The constituent elements of the solution are present in the following quantities:

Water	83.33
Sulphuric acid	9.83
Bichromate of potash	4.50
Sulphate of soda	2.33
	99.99

These proportions may be varied, of course, according to the desired resistance of the battery.—*Journal of Practical Chemistry.*

The Fusion of Platinum.

THE interest of chemists was lately excited by the announcement that the celebrated chemist DEVILLE had fused platinum in an ordinary wind furnace of small dimensions, but the details given were too meagre to satisfy any but the most superficial curiosity. The following however, cut from our foreign exchanges, is more satisfactory:—"The following arrangement of a furnace enables us to effect this fusion easily, and to produce a temperature which may be useful both in research and in practice. In a saltpetre refinery at Lille there is a large chimney, 30 metres high and 1 1-5 metre in diameter. It serves for a vent to eight large steam-boiler furnaces, fed with coal, and which maintain a constant and energetic draught. A small door, opening into the base of the chimney, and generally closed by a small brick wall, communicates with the interior. Before this door, at the foot of the chimney, a small wind-furnace is constructed, of which the outside bulk does not exceed a cubic metre. The grate, of movable iron bars, is a square of 0·30 metre. The capacity of the fire-box is 45 litres, and the flue communicating with the interior of the chimney is one-fifth of a metre in width. The first experiments were made with coke as fuel. Parisian and Hessian crucibles were tried, as well as those of black-lead and lime, and in each were placed, to try the heat, about 50 grammes of iron nails. The operation lasted scarcely an hour; the combustion was very active, the draught roared loudly, and the light of the fire was dazzling. In every case, crucible and metal were fused together, leaving on the bars a vitreous slag. Coke was replaced with gas-coke, in the hope of obtaining a more moderate action. The phenomena were the same, but even more intense. The best result was obtained by cutting a piece of gas-coke into the shape of a crucible, and placing it within a Hessian crucible. In this 50 grammes of platinum were placed, partly in a spongy state and partly in clippings. After the fire had been maintained for an hour, a button of platinum was obtained, perfectly fused, and weighing 50 grammes. The experiment of Ebelmann was repeated, who obtained crystalline alumina, by heating in a porcelain furnace of alumina and borax. After the borax was volatilised the interior of the crucible was covered with a layer of small hard crystals of alumina, translucid and very brilliant."

The Duties of a Signal Man.

TRAVELERS who have passed through the Grand Central Depot in New York have noticed the regularity with which every movement is directed by signal, but probably few of them have imagined that those signals are sounded by a man who has nothing to do with the effects he produces, but is confined to the monotonous duty of touching a knob at a certain hour and minute in the day. The New Haven (Conn.) *Register*, of recent date, says: "On Saturday last, at the Grand Central Depot in New York, by the kindness of Station-master FRANKLIN, we spent half an hour in the signal office of glass, at the north end of the depot, where a full view of all incoming and departing trains was obtained, and the thorough system of signalizing in force fully explained. About 150 trains leave and arrive at this station every day, and the departure and arrival of every one is controlled by the signal officer. This officer has between thirty and forty different telegraph signals to touch, on a table at his side, and none of them are labeled. He touches one half an hour previous to the departure of an express train, another at twenty minutes previous to the departure of a way train, and the movement rings a bell in the waiting-room from which the passengers are to depart. The doors open instantaneously, and the crowd of passengers can be seen making their way for seats in the train for which they have tickets. He then touches a key which causes the engineer to back his engine into position where he can be readily ordered on to his train. At five minutes before the hour of departure he rings a bell in the waiting-room and baggage-room, notifying them not to check any more baggage and not to sell any more tickets, and when the time is up, he strikes a key to close the doors, and no more passengers can enter for that train. He strikes a signal which throws up a letter, either X, for the Harlem; Z, for the Hudson River, or Y, for the New York, New Haven & Hartford road, and at the same time rings a bell beside the engine, which notifies the engineer to back down. He then touches a key to ring a bell notifying the brakemen to couple on, and at the time of starting strikes a bell, and the 'All aboard' of the conductor is simultaneously heard. As soon as the train starts this officer makes a record of the departure, and immediately telegraphs to Mott Haven that such a train has left, with so many cars, and after raising signals at Fifty-third and Fifty-sixth street, so that no incoming trains shall interfere, his duties with the outgoing train are ended.

"Of incoming trains he has also a perfect control. Whenever a train passes the junction near Mott Haven, the operator there telegraphs where it is from, how many cars, and the time it passed. At Ninety-sixth street the train strikes a signal which sets a bell ringing in the signal office, which continues until the train reaches Seventy-sixth street, and then ceases. At Sixty first street another signal is struck, which rings a bell at the signal office, which rings until the train arrives at Fifty-sixth street. If the officer in charge sees that everything is clear for the train, he allows it to run in; if otherwise, he throws out a flying signal at Fiftieth street, which will stop the train until it is ready for the entrance to the Grand Central Depot. The departure and arrival of trains so frequently, without the least delay or accident, is a marvel, and is almost wholly dependent upon the signal officer. With the present arrangement, and competent officers in charge, an accident to an incoming or outgoing train is an impossibility."

Our Import of Iron.

THE demand for English iron in America began to fall off in the closing months of 1872, and the declension has since proceeded with a vengeance, our monthly shipments of railway iron to the United States, in the first eight months of this year, comparing as follows with the corresponding exports in the same direction in the corresponding period of 1872:

Month.	1872. Tons.		1873. Tons.
January	35,299	.....	27,838
February	53,131	.....	21,063
March	41,175	.....	20,552
April	50,588	.....	12,142
May	40,840	.....	20,857
June	37,978	.....	18,016
July	41,305	.....	13,925
August	40,005	.....	6,937
Total	340,321		141,330

The falling off disclosed by this year's figures will be seen to have been no mere casual decline, but a steady retrogression, due to influences which cannot be lightly or easily removed.—*Colliery Guardian.*

Puddling by Blast Furnace Gas.

PUDDLING by means of the escaping gases of the blast furnace has been successfully accomplished at Savignac-Lédrier, in France, by Langlade's process. This consists in first washing and cooling the gases, in order to condense the greater part of the moisture they contain and remove the greater part of the dust, and then using the gases in a regenerative furnace. The process has now been in regular working since February, 1871, with uniformly favorable results. The gases leave the furnace at a temperature of 150° C., and enter the regenerators at a temperature of 15° to 20° C., having given up the greater part of their watery vapor. Their composition is constant and their pressure uniform. They are so far freed from dust that the regenerators require cleaning only once in nine months. The temperature attained is much higher than in the ordinary puddling furnace, and can be readily regulated. The labor of puddling is much easier, the puddler has much less to do, as he has no firing to attend to, and can therefore devote his whole time to the iron in the furnace,

The production of the furnace is high ; 14 to 16 charges of 210 kilogrammes (4 cwt.) can be puddled daily. The waste is less than usual, and the iron is never burnt in balling. One thousand kilogrammes bar iron are obtained from 1,200 kilogrammes gray pig iron ; whereas, in ordinary puddling, 1,300 kilogrammes are used. The blast furnace at Savignac produces daily 2,500 kilogrammes (24.5 tons) pig iron, and furnishes gas sufficient to puddle 3,000 kilogrammes (29 tons), so that we might expect a blast furnace producing 5,000 kilogrammes (49 tons) would yield gas enough to supply two puddling furnaces and a heating furnace besides. This use of blast-furnace gases is, of course, only applicable where they are not needed for steam power to furnish the blast.

Movements of Manufacturers.

THE Cambria Iron Company, Johnstown, give notice that, owing to the monetary crisis and the low price of iron they have but two alternatives—either to close the works entirely, or to reduce the price of manufacture. They have chosen the latter, and announce that on and after the 1st day of October the current wages of the employees not regulated by the gold value of iron will be reduced from 10 to 12 per cent. It is said the employees will cheerfully accept the situation.

Notices have been posted up in the Allentown Rolling Mill, informing employees that the wages of all receiving more than $2 per day, are to be reduced 15 per cent., and of all receiving less than $2 per day, 10 per cent.

Twenty-five per cent. of the force of workmen employed by the Dickson Manufacturing Company, of Scranton, have been discharged, and the wages of those retained reduced 10 per cent. This is owing to the countermanding of orders for locomotives by railroads affected by the financial troubles.

The proprietors of the Southwark Foundry in Philadelphia having informed their men that wages must be lowered, a strike was the consequence. Negotiations commenced, and at a meeting of the strikers of the Southwark Foundry, held October 15, a report was received that Mr. Morris, the proprietor, was willing to compromise by making the reduction ten per cent. instead of twenty per cent. on the wages of mechanics, and a corresponding reduction on laborers' wages. Upon a vote being taken, 179 voted for resumption, and 101 against it. In the meantime, however, Mr. Morris was declared to have suspended.

The Manufacturers' Board of Trade of Fall River, Mass., have voted to recommend a suspension of all the mills two days in each week, and to run only eight hours a day during the other four days for the present.

Australian Mining.

THE development of the mining industry in the sub-Continent of Australia is such as to place that country in the foremost rank of metal producing regions of the globe. The quantity of gold coined at the Melbourne mint from July to December, 1872, was 45,969 oz.; the average weight of the sovereigns coined during the quarter ending December was .25683 oz.; and the average proportion of gold in 1,000 parts 916.666. The standard weight of a sovereign is .25682 oz., and the standard fineness 916.666 parts of gold in 1000.

From the statistics of the Government department of mines, which were issued a few weeks ago, it appears that there were 52,965 miners in the colony in 1872, of whom 36,141 were engaged in alluvial mining and 16,824 in quartz-mining. The quantity of gold raised in 1872 was estimated at 1,331,377 oz. The earnings of alluvial miners during the year were computed at £65 0s. 6½d.; of quartz-miners, at £150 0s. 6½d., reckoning according to the amount of gold obtained; and the average earnings of each man when the gold was divided amongst the 52,965 was £93 6s. The number of distinct auriferous quartz reefs worked or prospected at the end of 1872 was 3,224, and the total area of the alluvial and quartz ground which had been actually opened up was 1,026 square miles. The value of the gold and other metals and minerals raised in the colony from the first discovery of the gold fields to the 31st December, 1872, is estimated by the department at £168,566.033, which is made up principally from gold, silver, tin, copper, and antimony, as follows :—Gold, £168,149,305; silver, £5281; tin, £282,105 ; copper, £5,810 ; and antimony, £77,237.

Engineering and Mechanical Notes.

IT is said that hundreds of the Gartsherrie coal-cutting machines have already been ordered, and that they cannot be produced with sufficient rapidity to keep pace with the growing demand. It is satisfactory to find that—according to the evidence of MR. MACDONALD before the Coal Committee—no objection exists on the part of the colliers to the use of these machines. According to this gentleman, the "intelligent coal miner" is prepared to welcome anything that takes away "that heavy physical labor." Some of the more advanced philosophers of the pit would, we are told, be "glad to see the entire work done by machinery."

MR. F. DEAKIN, of Willenhall, Eng., has brought out a new puddling furnace. This invention consists in supporting the iron plates forming the bed of the furnace upon troughs of iron open at the top, resting upon transverse bearers. These troughs are supplied with water by a perforated pipe, the water from which trickles to the troughs, the level of the water in the troughs being maintained at a short distance from the underside of the bottom plates supported upon them By this arrangement the heat from the bottom plates passes to the troughs, and also to the water in them, and by the evaporation of the water the undue heating of the plates is prevented. An arrangement of this kind might be found profitable in a region where labor is much dearer than fuel, but under ordinary circumstances the large amount of heat carried off by the water would be found a serious item of expense.

MINING SUMMARY.

Colorado.

BOULDER COUNTY.

THE MINES OF CARIBOU AND SUGAR LOAF.

Correspondence of the Central City *Register* of October 8, dated CARIBOU, September 27, 1873.

THE CARIBOU MINE

is much more extensive and systematically worked by its present owners, the "Mining Company Nederland," than by its former proprietors. There are 135 men employed above and below, which force will be steadily increased as the mine is developed. The miners receive $3.25 per day, (eight hours), and are divided into three "shifts,' or reliefs, of eight hours each. About fifty tons of rock are raised from the shafts every twenty-four hours, of which nearly one-half is quartz, of sufficient value to be sent to the mill for refinement. The crevice of the lode varies from four to ten feet in width, and the ore sent to the mill yields from forty to hundreds and often several thousands of dollars. Near the main shaft the mine has been worked out down to the 200-foot level. Work began on the 300-foot level last week. The ore now being raised from the east shaft is surpassingly rich, showing seams of native silver in all parts of the vein. The depth of the mine or discovery shaft, which is sunk on the most elevated part of the lode, is 370 feet. No work is being done in the bottom of this shaft at present, on account of water, and yet I was informed that this is the best spot yet found on the lode.

THE CARIBOU TUNNEL,

which is being driven into this mountain, and is already in 500 feet, will intersect the mine at the depth of the main shaft, and 200 feet further than the present head of the tunnel. This will effectually drain the Caribou and other neighboring mines and will greatly facilitate their working. The central portion of the Caribou lode is covered by two spacious shaft and engine houses, which are to be increased in size to accommodate a one hundred-horse power engine, now being put up. This engine will be rigged so as to hoist ore from four differeht shafts, through which the entire 1,400 feet of the lode can be operated.

Your readers have been fully apprised of the additions being made to the Nederland Company's Reduction Works at Middle Boulder. These improvements will insure an increase of capacity to thirty-five tons per day. At present the company are treating only their own ore, and producing, on an average, $1,000 in bullion daily. Arrangements have been perfected, I understand, looking to the erection of two more mills, which will be located on the headwaters of the North Boulder. Such an addition of facilities will enable the miners to market their ores without hauling them from twenty to sixty miles. In such an event one hundred mines will be operated profitably. Then the prosperity of Caribou will be marvellous.

THE SHERMAN LODE,

though as yet but partially developed, has a splendid local reputation, and is regarded by many as equaling the Caribou. It has been sunk upon to a depth of 100 feet. The pay vein is from two to three feet wide; the ore is marketable at from $300 to $400 per ton.

THE NO-NAME,

which crosses the east end of the Caribou, has a very wide crevice, and yields big pay, say from $400 to $800 per ton.

CARIBOU, Sept. 30, 1873.

I have just returned from the Sugar Loaf, or the "Telluride Belt," a region which is rapidly becoming the abode of active and most productive industry. The opening of this enormous source of wealth is a matter of extraordinary importance to the Territory at large. During my stay in the district I gathered considerable information concerning various properties.

The Lindley lode, owned by J. C. BLAKE, is a property of assured value, and gives every indication of developing fabulous richness. It is a thoroughly argentiferous vein, and such an one as is rarely found in any country. The crevice is about thirty feet in width, and almost wholly free of barren rock. Messrs. HARRIS, BENNETTS & Co. have agreed, in consideration of receiving a deed to one-half of the lode, to sink a 100-foot shaft, and are progressing rapidly. At a depth of thirty feet they drove a cross-cut, which penetrated eight feet of as solid, well defined and rich a body of ore as any yet uncovered in the Territory. This ore assayed $463.65 to the ton. Brittle silver is disseminated throughout the vein.

The old Pay lode has been sunk upon to a depth of twenty feet. This amount of work has exposed two feet of ore at the bottom of the shaft. This is intermixed with sulphurets of silver and zinc blende. It assays $500 per ton.

The owners of the Scott lode have sunk upon it to a depth of 35 feet. The vein is small, but the material yields from $100 to $300 to the ton. Brittle silver in small quantities has been revealed.

Mr. J. C. BLAKE is driving a tunnel along the Ogalalla lode. The bore is already in 73 feet, and has opened up a three-foot vein of quartz that looks well.

The Forest lode is not being worked at present. The owners are erecting a boarding house for their workmen. When this is completed operations will be resumed on the mine with a large force. Tellurium and petzite are found in the Forest. I saw several specimen chunks of ore containing these minerals interwoven with wire gold. Third class ore from this mine has been marketed at Hill's at the rate of $302 per ton.

The Yellow Cloud, owned by SCHUYLER & LADD, and the Printer boy, owned by J. C. BLAKE, both run about parallel with the Forest, and may be the continuation of it. The latter is well timbered, and is being developed systematically ; the crevice is five feet wide, and embodies considerable iron. The Saylorville mine, the property of HINDMAN & SON, is of a character with the Forest, and shows tellurium and petzite, mixed with gold. The vein averages six feet in width.

I consider the Phœnix one of the best mines in the district, and yet it is not worked. It is owned by HARRIS, BENNETTS & Co. The crevice is eighteen inches wide, and the 6-inch vein of ore will pay from $500 to $700 per ton, in silver.

Most of the machinery has been removed from the Hoosier works. The failure of this enterprise may, I think, be ascribed to the machinery. The Hoosier mine has been leased by B. O. CUTTER & Co. There can be no question about the value of this property.

I have no doubt that Sugar Loaf will eventually prove one of the greatest silver producing districts in the Territory.

Nevada.

A GOOD RUN.

Last February the South Aurora Mill, White Pine, started up on a run of 6,000 tons of ore for the Eberhardt & Aurora Company, and the work has been completed. The Superintendent of the mill has furnished the White Pine *News* with the following statement, showing the result:

The total quantity worked was 6,064½ tons, the average assay value of which was $56.78 per ton. Total assay value, $343,357.26. Actual value of bullion produced and deposited, $298,892.82. This result shows the ore to have been worked up to 87 per cent. of the assay value. The average number of tons worked per day was 37 8—the mill carrying thirty stamps. The loss of quicksilver was but 1.77 pounds per ton. The ore was furnished entirely from the North Aurora mine, under the superintendence of Captain FRANK DRAKE. Although the ore was remarkably free chloride, containing but a small per cent. of base matter, still the yield is acknowledged to have equalled, if not excelled, any which has ever been made on the same class of ores produced in the mines of Treasure Hill.

The mill company guaranteed 82½ per cent. of assay value, and as the yield was about five per cent. above this, the mill owners made $20,000 over and above the milling price of $13 per ton. As they received $78,598 for the milling work, they got altogether upwards of $98,000 for the whole job. The *News* thinks that perhaps it is due to the encouragement given to the Eberhardt & Aurora Company, that they have determined to rebuild the mill burned last year. It is expected that this mill—thirty stamps—will start up on the first of next month. It now looks as though White Pine, notwithstanding its many reverses, would come out all right after all.

Alaska.

THE ALASKA GOLD MINES.

From the San Francisco *Mining and Scientific Press* of Sept. 27.

We have several times alluded to the gold mines discovered in Alaska and recently received from A. H. PRINCE, Secretary of the Gold Mining Company, several specimens of the ore from those mines. He writes us that there are at present only two ledges being worked—Mooney's and the Alaska Gold Mining Company's. Mooney's is situated about nine miles down Silver Bay, about 100 yards from the beach, alongside of which any vessels of any size can go. Work was recently started up in this claim. The ledge is well defined and some very good looking rock is coming out. The ledge belonging to the Alaska Gold Mining Company is situated on Cedar Creek, about two and a half miles from the head of the bay, 14 miles from Sitka, but a shorter and better road to the mine will probably be soon built, which will lessen the distance one-half. The ledge is held by a party of seven. Up to the present time a short tunnel has been run, the rock looking well, being in most places heavily charged with ore. Two tons of this ore have been sent to this city to be crushed. The rock sent is said to be fully equal, if not superior, to that sent to Mr. Fisk, an assayer in Portland, and which gave returns of from $100 to $276 to the ton, in gold. Mr. Prince says that if the ore turns out as well as they expect, and gives a fair yield, they have plenty more on hand ready to ship. A quartz mill is needed there, but the miners being all poor men, they are unable to procure one. The whole district where the mines are found abounds in quartz ledges. Numerous discoveries have been made, and Mr. Prince writes that they have found copper, cinnabar, silver and coal in different places. The discoverers all being poor men, they are unable to do anything with the locations, but are, like many other miners, waiting for capitalists to help to develop the mineral fields of our new Territory. A prejudice exists against the climate of Sitka, but Mr. Prince says it is not as bad as painted. Out-door work, he says, can be prosecuted all the year round, the same as elsewhere. Living, he tells us, is as cheap as at any place on the coast Venison sells for 50 cents per quarter; salmon, when in season, from 15 to 25 cents each. There is plenty of good timber and water everywhere. The Indians are peaceably disposed and work for 50 cents a day. The rock sent us is a white quartz sprinkled with free gold, and very much resembling the class of ore coming from some of the San Diego mines.

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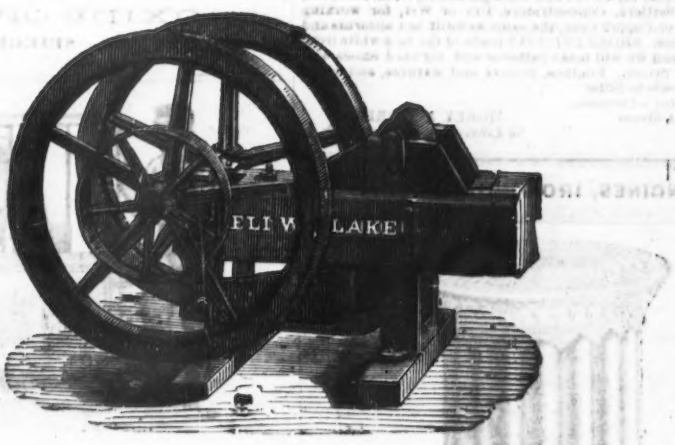

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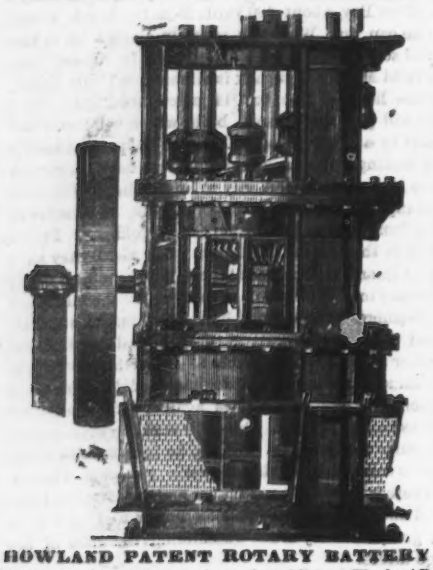

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of 12 stamps. It requires no frame to put it up. The best Battery ever used for amalgamating gold, or crushing silver ores, dry or wet. Can be put up on a mine in running order for one-half the price of the straight battery, and in three days after its arrival at the mine. 12-stamp battery, 20,000 pounds, with frame complete; 6-stamp battery, 7,000 pounds. Every mill run at shop before shipping.

CALIFORNIA STAMP MILLS,

All the various styles of Pans, Amalgamators, Rock Breakers, Separators, Settlers, Concentrators, Dry or Wet, for working Gold, Silver or Copper Ores, the same as built in California and at lower prices. SHOES AND DIES made of the best white iron. Send sizes and we will make patterns and forward Shoes and Dies at low prices. Engines, Boilers and fixtures, and other Machinery made to order.

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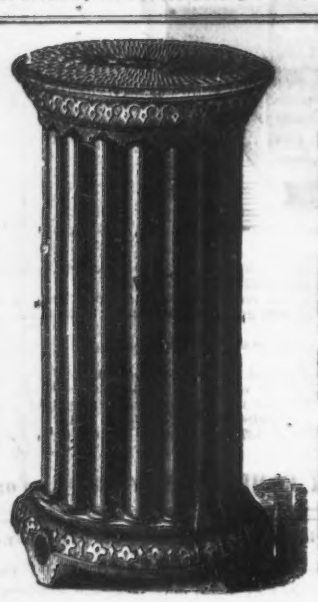

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JOSEPH NASON & CO., 61 BERKMAN ST., corner of Gold street.—WROUGHT and CAST-IRON PIPES; all kinds of STEAM and GAS FITTINGS; Apparatus for WARMING and VENTILATING BUILDINGS.

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OF THE

Kingdoms of Prussia and Saxony.

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The Bessemer Steel Works,
of John A. Griswold & Co.
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B. F. Sturtevant, Boston, Mass.,

Dear Sir, We have changed your No. 8 for your No. 9. Pressure Blower. The time in melting is about the same with either Blower. We are melting 225,000 lbs. 112½ tons, Pig Iron daily, (20 hours running time.) It works well.

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OXIDE OF ZINC, SPELTER, SHEET ZINC.

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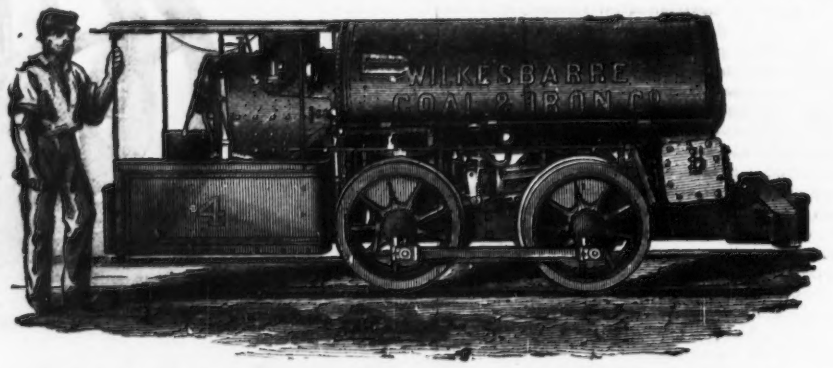

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Gauge, two feet six inches or upwards; Hight above rail, five feet four inches; Width over all, five feet one inch. Ads to burn Anthracite or Bituminous coal or coke.

Materials and Workmanship Equal to those in Full Gauge Railroad Locomotives,

Guaranteed to pass curves of twenty-five feet radius and haul on a level track in good condition.

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The **simplest, most durable** and **effective** pump now in use. Adapted to **all situations**, and performs all the functions of a steam pump without its consequent wear and care. No machinery about it. Nothing to wear out. Will pump **gritty** or **muddy** water without wear or injury to its parts. It cannot get out of order.

C. HENRY HALL & CO.,
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FOR CUPOLA FURNACES AND FORGES.

Also manufacturer of the Sturtevant Patent Improved Fan Blower and Exhaust Fan. Send for illustrated catalogue.
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CONCENTRATOR
AND COMPLETE MACHINERY
FOR CRUSHING SCREENING
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Minerals and Ores in which the difference of specific gravity is so slight and which are also sometimes in such fine particles as to defy separation by any other machinery or method, are rapidly separated by this Concentrator.

Mr. W. Bement, of Georgetown, Col., concentrating Silver ores, says: "I am satisfied your machines can not be beaten; they are simple, require no power (comparatively,) and do not get out of order."

A comparison is challenged between the results obtained by the approved methods of water concentration and the complete system of dry-ore concentration in the amount of ore saved, quantity concentrated, economy of working, and comfort of the operators and workmen.

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For information and circulars, apply to
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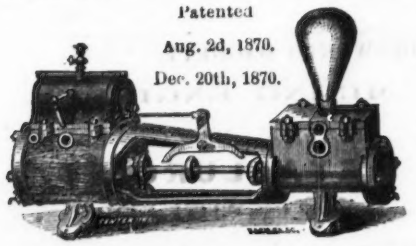
THE SELDEN DIRECT-ACTING
STEAM PUMP
A. CARR, Manufacturer & Proprietor.

Patented
Aug. 2d, 1870.
Dec. 20th, 1870.



Combining simplicity and durability to a remarkable degree. Its parts are easy of access, and it is adapted to ALL PURPOSES for which Steam Pumps are used.

AS A MINING PUMP

It is unsurpassed. Also,

Steam, Gas and Water Pipe, Brass Work, Steam and Water Gauges, Fittings, etc. etc.

CARR PATENT STEAM RADIATOR.

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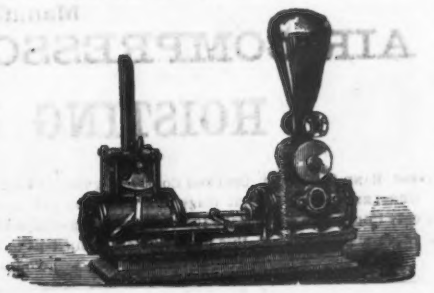
STEAM PUMPS.

Niagara Steam Pump Works.



This Pump has taken the first premium at every Fair in the United States where there has been a practical test.

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Patented in England, Belgium and France. Send for circular.
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MANUFACTORY,
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Steam Pumping Engines, Single and Duplex, Worthington's Patent, for all purposes, such as Water Works Engines, Condensing or Non-condensing; Air and Circulating Pumps, for Marine Engines; Blowing Engines; Vacuum Pumps, Stationary and Portable Steam Fire Engines; Boiler Feed Pumps, Wrecking Pumps,

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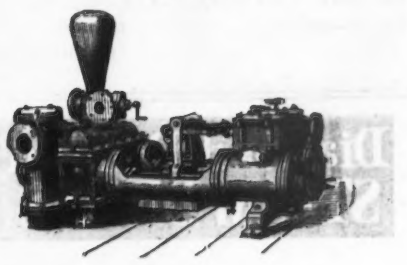

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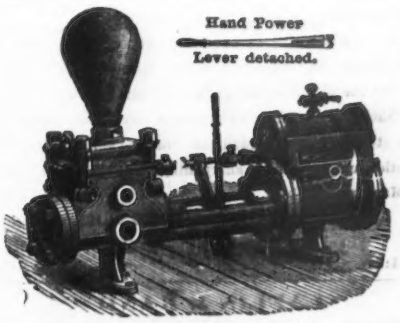

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Mines at Newburgh, Preston Co., W. Va.
Company's Office, No. 52 S. Gay St. Baltimore, Md.
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This Company offer their very superior Gas Coal at lowest market prices.

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It has been for many years very extensively used by various Gas Companies in the United States, and we beg to refer to the Manhattan, Metropolitan, and New York Gas Light Companies of New York, the Brooklyn and Citizens' Gas Light Companies of Brooklyn, N. Y., the Baltimore Gas Light Company of Baltimore, Md., and Providence Gas Light Company, Providence, R. I.

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FROM THE BUCK MOUNTAIN VEIN.
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DETMOLD & COX,
ANTHRACITE AND BITUMINOUS
COALS.
Office, 40 Trinity Building, New York. jan2-1y

STEPHEN S. LEE & SON,
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GEORGE'S CREEK COAL.
SWANTON MINES,
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Miners and Shippers of the best George's Creek Cumberland Coal.

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THE DESPARD COAL COMPANY OFFER THEIR Superior DESPARD COAL to Gas Light Companies throughout the country.

MINES IN HARRISON COUNTY, West Virginia.
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MANIPULATORS OF
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MANUFACTURERS OF
Sweet's Cast Steel Crow Bars,
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Nov. 19:1y

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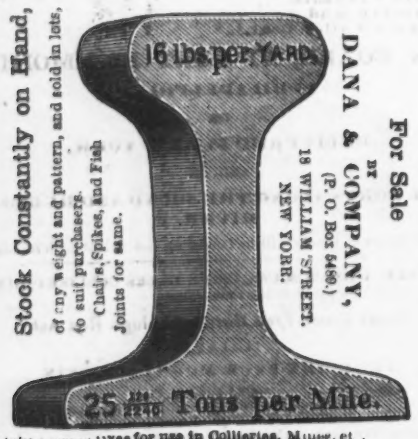
of any weight and pattern, and sold in lots, to suit purchasers.
Chairs, Spikes, and Fish Joints for same.



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Bar Iron, Braziers' Rods, Wire Rods, Rivet and Machinery Iron, Iron and Steel
Wire of all Kinds, Copperas,
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PUDDLED AND REFINED CHARCOAL BLOOMS,
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Works at Trenton and Ringwood, N. J.
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Manufacturers of
AIR COMPRESSORS, ROCK DRILLS
AND
HOISTING MACHINERY.

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Yours, etc., WM. WISEMAN, Superintendent.

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Andrews's Patents, Noiseless, Friction-Grooved, Portable and Warehouse Hoisters.
FRICTION OR GEARED MINING AND QUARRY HOISTERS.
For Hoisting and Conveying Material to any Distance by Wire Cables.
Smoke-burning Safety Boilers. Oscillating Engines, Double and Single, ¼ to 100 horse-power. Centrifugal Pumps, 100 to 100,000 gallons per minute. Best Pumps in the world; pass mud, sand, gravel, coal, grain, etc., without injury. All light, simple, durable and economical.
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Adapted to Every Possible Duty
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WORKS.....MORRISTOWN, N. J. jl 15:tf

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They are adapted to CHANNELLING, GADDING, SHAFTING, TUNNELLING and open cut work; also to DEEP BORING for TESTING the VALUE of MINES and QUARRIES. TEST ORES taken out, show the character of mines at any depth. Used either with steam or compressed air. Simple and durable in construction and never need sharpening.

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invite attention to their facilities for delivering
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SAFETY FUSE,
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New Patterns, of any desirable weight, made to order on Short Notice.

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